

## Journal Papers and Letters

- [1] S. Taravati, B. S. Khan, S. Gupta, K. Achouri, and C. Caloz, “Nonreciprocal nongyrotropic magnetless metasurface,” *IEEE Trans. Antennas Propag.*, vol. 65, no. 7, pp. 3589–3597, Jun. 2017.
- [2] G. Zhang, Q. Zhang, Y. Chen, T. Guo, C. Caloz, and R. D. Murch, “Dispersive feeding network for arbitrary frequency beam scanning in array antennas,” *IEEE Trans. Antennas Propag.*, vol. 65, no. 6, pp. 3033–2840, Jun. 2017.
- [3] A. Al-Bassam, S. Otto, D. Heberling, and C. Caloz, “Broadside dual-channel orthogonal-polarization radiation using a double-asymmetric periodic leaky-wave antenna,” *IEEE Trans. Antennas Propag.*, vol. 65, no. 6, pp. 2855–2864, Jun. 2017.
- [4] L. Zou, S. Gupta, and C. Caloz, “A simple picosecond pulse generator based on a pair of step recovery diodes,” *IEEE Microw. Wireless Compon. Lett.*, vol. 27, no. 5, pp. 467–469, May 2017.
- [5] S. Sandeep, J. M. Jin, and C. Caloz, “Finite element modeling of metasurfaces with generalized sheet transition conditions,” *IEEE Trans. Antennas Propag.*, vol. 65, no. 5, pp. 2413–2420, May 2017.
- [6] L. Chen, K. Achouri, E. Kallos, and C. Caloz, “Simultaneous enhancement of light extraction and spontaneous emission using partially-reflecting metasurface cavity,” *Phys. Rev. A*, vol. 95, pp. 053808:1–7, May 2017.
- [7] L. Zou, S. Gupta, and C. Caloz, “Loss-gain equalized reconfigurable C-section analog signal processor,” *IEEE Trans. Microw. Theory Tech.*, vol. 65, no. 2, pp. 555–564, Feb. 2017.
- [8] S. Taravati and C. Caloz, “Mixer-duplexer-antenna leaky-wave system based on periodic space-time modulation,” *IEEE Trans. Antennas Propag.*, vol. 65, no. 2, pp. 442–452, Feb. 2017.
- [9] K. Achouri, A. Yahyaoui, S. Gupta, H. Rmili, and C. Caloz, “Dielectric resonator metasurface for dispersion engineering,” *IEEE Trans. Antennas Propag.*, vol. 65, no. 2, pp. 673–680, Feb. 2017.
- [10] K. Achouri, G. Lavigne, and C. Caloz, “Comparison of two synthesis methods for birefringent metasurfaces,” *J. Appl. Phys.*, vol. 120, no. 235305, pp. 1–11, Dec. 2016.
- [11] S. Gupta and C. Caloz, “Perfect dispersive medium for real-time signal processing,” *IEEE Trans. Antennas Propag.*, vol. 64, no. 12, pp. 5299–5308, Dec. 2016.
- [12] Y. Vahabzadeh, K. Achouri, and C. Caloz, “Simulation of metasurfaces in finite difference techniques,” *IEEE Trans. Antennas Propag.*, vol. 64, no. 11, pp. 4753–4759, Nov. 2016.
- [13] T. Guo, Q. Zhang, Y. Chen, R. Wang, and C. Caloz, “Shunt-stub and stepped-impedance broadband reflective phasers,” *IEEE Microw. Wireless Compon. Lett.*, vol. 26, no. 10, pp. 807–809, Oct. 2016.

- [14] S. Taravati, S. Gupta, Q. Zhang, and C. Caloz, “Enhanced bandwidth and diversity in real-time analog signal processing (R-ASP) using nonuniform C-section phasers,” *IEEE Microw. Wireless Compon. Lett.*, vol. 26, no. 9, pp. 663–665, Sept. 2016.
- [15] N. Chamanara and C. Caloz, “Graphene transverse electric surface plasmon detection using nonreciprocity modal discrimination,” *Phys. Rev. B*, vol. 94, no. 7, pp. 075413:1–6, Aug. 2016.
- [16] H. Qu, Z.-L. Deck-Léger, C. Caloz, and M. Skorobogatiy, “Frequency generation in moving photonic crystals,” *J. Opt. Soc. Am. B*, vol. 33, no. 8, pp. 1616–1626, Jul. 2016.
- [17] K. Achouri, G. Lavigne, M. A. Salem, and C. Caloz, “Metasurface spatial processor for electromagnetic remote control,” *IEEE Trans. Antennas Propag.*, vol. 64, no. 5, pp. 1759–1767, May 2016.
- [18] C. Caloz, “Tomorrow’s metamaterials: manipulation of electromagnetic waves in space, time and spacetime,” *arXiv:1602.04340*, Feb. 2016.
- [19] S. Gupta and C. Caloz, “Leaky-wave antennas with combined electric and magnetic dipole radiation,” *Recent Progress in Space Technology*, vol. 5, pp. 1–8, 2016, *invited*.
- [20] K. Achouri, B. A. Khan, S. Gupta, G. Lavigne, M. A. Salem, and C. Caloz, “Synthesis of electromagnetic metasurfaces: principles and illustrations,” *EPJ Appl. Metamat.*, vol. 2, no. 12, pp. 1–11, Jan. 2016, *invited*.
- [21] T. Guo, Q. Zhang, Y. Chen, R. Zhang, and C. Caloz, “Single-step tunable group delay phaser for real-time spectrum sniffing,” *IEEE Microw. Wireless Compon. Lett.*, vol. 25, no. 12, pp. 808–810, Dec. 2015.
- [22] Q. Zhang, T. Guo, B. A. Khan, T. Koderer, and C. Caloz, “Coupling matrix synthesis of nonreciprocal lossless two-port networks using gyrators and inverters,” *IEEE Trans. Microw. Theory Tech.*, vol. 63, no. 9, pp. 2782–2792, Sept. 2015.
- [23] H. S. Skulason, D. L. Sounas, F. Mahvash, S. Francoeur, M. Siaj, C. Caloz, and T. Szkopek, “Field effect tuning of microwave Faraday rotation and isolation with large-area graphene,” *Appl. Phys. Lett.*, vol. 107, pp. 093106:1–6, Sept. 2015.
- [24] S. Ding, R. Zang, L. Zou, B. Wang, and C. Caloz, “Enhancement of time-reversal subwavelength wireless transmission using pulse shaping,” *IEEE Trans. Antennas Propag.*, vol. 63, no. 9, pp. 4169–4174, Sept. 2015.
- [25] K. Achouri, M. A. Salem, and C. Caloz, “General metasurface synthesis based on susceptibility tensors,” *IEEE Trans. Antennas Propag.*, vol. 63, no. 7, pp. 2977–2991, Jul. 2015.
- [26] W. Liao, Q. Zhang, Y. Chen, and C. Caloz, “Compact reflection-type phaser using quarter-wavelength transmission line resonators,” *IEEE Microw. Wireless Compon. Lett.*, vol. 25, no. 6, pp. 391–393, Jun. 2015.

- [27] M. A. Salem and C. Caloz, "Space-time cross-mapping and application to wave scattering," *arXiv:1504.02012*, May 2015.
- [28] S. Gupta, Q. Zhang, L. Zou, L. J. Jiang, and C. Caloz, "Generalized coupled-line all-pass phasers," *IEEE Trans. Microw. Theory Tech.*, vol. 63, no. 3, pp. 1007–1018, Mar. 2015.
- [29] N. Chamanara and C. Caloz, "Fundamentals of graphene magnetoplasmons: principles, structures and devices," *Forum for Electromagnetic Research Methods and Application Technologies (FERMAT)*, vol. 10, pp. 1–15, Mar. 2015, *invited*.
- [30] M. A. Salem and C. Caloz, "Electromagnetic fields radiated by a circular loop with arbitrary current," *IEEE Trans. Antennas Propag.*, vol. 63, no. 1, pp. 442–446, Jan. 2015.
- [31] S. Gupta and C. Caloz, "Spatio-temporal metasurface for real-time 2-D spectrum analysis," *arXiv:1412.7791*, Dec. 2014.
- [32] B. Nikfal, Q. Zhang, and C. Caloz, "Enhanced-SNR impulse radio transceiver based on phasers," *IEEE Microw. Wireless Compon. Lett.*, vol. 24, no. 11, pp. 778–780, Nov. 2014.
- [33] M. A. Salem, K. Achouri, and C. Caloz, "Metasurface synthesis for time-harmonic waves: exact spectral and spatial methods," *Progress Electromag. Research*, vol. 149, pp. 205–216, Nov. 2014, *invited*.
- [34] T. Paradis, S. Gupta, Q. Zhang, L. J. Jiang, and C. Caloz, "Hybrid-cascade coupled-line phasers for high-resolution radio-analog signal processing," *Microw. Opt. Technology Lett.*, vol. 56, no. 11, pp. 2502–2504, Nov. 2014.
- [35] S. Otto, A. Al-Bassam, A. Rennings, K. Solbach, and C. Caloz, "Transversal asymmetry in periodic leaky-wave antennas for Bloch impedance and radiation efficiency equalization through broadside," *IEEE Trans. Antennas Propag.*, vol. 62, no. 10, pp. 5037–5054, Oct. 2014.
- [36] S. Gupta, L. J. Jiang, and C. Caloz, "Magneto-electric dipole antenna arrays," *IEEE Trans. Antennas Propag.*, vol. 62, no. 7, pp. 3613–3622, Jul. 2014.
- [37] M. A. Salem and C. Caloz, "Manipulating light at distance by a metasurface using momentum transformation," *Opt. Express*, vol. 22, no. 12, pp. 14530–14543, Jun. 2014.
- [38] Q. Zhang, S. Gupta, and C. Caloz, "Synthesis of broadband phasers formed by commensurate C- and D-sections," *Int. J. RF Microw. Comput. Aided Eng.*, vol. 24, no. 3, pp. 322–331, May 2014.
- [39] L. Zou, Q. Zhang, and C. Caloz, "Planar reflective phaser and synthesis for radio analog signal processing R-ASP," *arXiv:1404.2628*, Apr. 2014.
- [40] S. Gupta, L. J. Jiang, and C. Caloz, "Unveiling magnetic dipole radiation in phase-reversal leaky-wave antennas," *IEEE Antennas Wirel. Propag. Lett.*, vol. 13, pp. 786–789, Apr. 2014.

- [41] S. Otto, Z. Chen, A. Al-Bassam, A. Rennings, K. Solbach, and C. Caloz, "Circular polarization of periodic leaky-wave antennas with axial asymmetry: theoretical proof and experimental demonstration," *IEEE Trans. Antennas Propag.*, vol. 62, no. 4, pp. 1817–1829, Apr. 2014.
- [42] Q. Zhang, J. W. Bandler, and C. Caloz, "Design of dispersive delay structures (DDSs) formed by coupled C-sections using predistortion with space mapping," *IEEE Trans. Microw. Theory Tech.*, vol. 61, no. 12, pp. 4040–4051, Dec. 2013.
- [43] N. Chamanara, D. L. Sounas, T. Szkopek, and C. Caloz, "Terahertz magnetoplasmon energy concentration and splitting in graphene PN junctions," *Opt. Express*, vol. 21, no. 21, pp. 25 356–25 363, Oct. 2013.
- [44] Q. Zhang and C. Caloz, "Alternative construction of the coupling matrix of filters with non-paraconjugate transmission zeros," *IEEE Microw. Wireless Compon. Lett.*, vol. 23, no. 10, pp. 509–511, Oct. 2013.
- [45] D. L. Sounas, C. Caloz, and A. Alù, "Giant nonreciprocity at the sub-wavelength scale using angular-momentum biased metamaterials," *Nat. Comm.*, vol. 4, no. 2407, pp. 1–7, Sept. 2013.
- [46] C. Caloz, S. Gupta, Q. Zhang, and B. Nikfal, "Analog signal processing," *IEEE Microw. Mag.*, vol. 14, no. 6, pp. 87–103, Sept. 2013, *invited*.
- [47] A. Parsa, R. Paknys, and C. Caloz, "Multilayered media Green's function construction using signal flow graphs," *IEEE Antennas Propag. Mag.*, vol. 55, no. 4, pp. 244–249, Aug. 2013.
- [48] A. Shahvarpour, A. Alvarez-Melcon, and C. Caloz, "Radiation efficiency issues in planar antennas on electrically thick substrates and solutions," *IEEE Trans. Antennas Propag.*, vol. 61, no. 8, pp. 4013–4025, Aug. 2013.
- [49] Q. Zhang and C. Caloz, "Power divider with arbitrary power ratio and arbitrary ripple level using filter synthesis techniques," *Microw. Opt. Technology Lett.*, vol. 55, no. 8, pp. 1819–1820, Aug. 2013.
- [50] Q. Zhang and C. Caloz, "Comparison of transmission and reflection allpass phasers for analog signal processing," *Electron. Lett.*, vol. 49, no. 14, Jul. 2013.
- [51] S. Gupta, D. L. Sounas, Q. Zhang, and C. Caloz, "All-pass dispersion synthesis using microwave C-sections," *Int. J. Circ. Theory Appl.*, pp. 1–18, May 2013.
- [52] D. L. Sounas, H. S. Skulason, H. V. Nguyen, A. Guermoune, M. Siaj, T. Szkopek, and C. Caloz, "Faraday rotation in magnetically-biased graphene at microwave frequencies," *Appl. Phys. Lett.*, vol. 102, no. 19, pp. 191 901:1–4, May 2013.
- [53] B. Nikfal, Q. Zhang, and C. Caloz, "Comment on "theoretical analysis and practical considerations for the integrated time-stretching system using dispersive delay line (DDL)"", *IEEE Trans. Microw. Theory Tech.*, vol. 61, no. 5, p. 1973, May 2013.

- [54] N. Chamanara, D. L. Sounas, and C. Caloz, “Non-reciprocal magnetoplasmon graphene coupler,” *Opt. Express*, vol. 21, no. 9, pp. 11 248–11 256, May 2013.
- [55] Q. Zhang, D. L. Sounas, S. Gupta, and C. Caloz, “Wave interference explanation of group delay dispersion in resonators,” *IEEE Antennas Propag. Mag.*, vol. 55, no. 2, pp. 212–227, Apr. 2013.
- [56] P. Lemaître-Auger, S. Abielmona, and C. Caloz, “Generation of Bessel beams by two-dimensional antenna arrays using sub-sampled distributions,” *IEEE Trans. Antennas Propag.*, vol. 61, no. 4, pp. 1838–1849, Apr. 2013.
- [57] N. Chamanara and C. Caloz, “Exact stability conditions in upwinding-scheme FDTD for the Boltzmann transport equation,” *Int. J. Num. Analysis Modeling*, vol. 27, no. 2, pp. 238–258, Mar. 2013.
- [58] T. Kodera, D. L. Sounas, and C. Caloz, “Magnetless non-reciprocal metamaterial (MNM) technology: application to microwave components,” *IEEE Trans. Microw. Theory Tech.*, vol. 61, no. 3, pp. 1030–1042, Mar. 2013.
- [59] Q. Zhang, D. L. Sounas, and C. Caloz, “Synthesis of cross-coupled reduced-order dispersive delay structures (DDS) with arbitrary group delay and controlled magnitude,” *IEEE Trans. Microw. Theory Tech.*, vol. 61, no. 3, pp. 1043–1052, Mar. 2013.
- [60] D. L. Sounas, T. Kodera, and C. Caloz, “Electromagnetic modeling of a magnet-less non-reciprocal gyrotropic metasurface,” *IEEE Trans. Antennas Propag.*, vol. 61, no. 1, pp. 221–231, Jan. 2013.
- [61] S. Gupta, D. L. Sounas, H. V. Nguyen, Q. Zhang, and C. Caloz, “CRLH-CRLH C-section dispersive delay structures with enhanced group delay swing for higher analog signal processing resolution,” *IEEE Trans. Microw. Theory Tech.*, vol. 60, no. 12, pp. 3939–3949, Dec. 2012.
- [62] T. Kodera, D. L. Sounas, and C. Caloz, “Switchable magnet-less non-reciprocal metamaterial (MNM) and its application to a switchable Faraday rotation metasurface,” *IEEE Antennas Wirel. Propag. Lett.*, vol. 11, pp. 1454–1457, Dec. 2012.
- [63] A. I. Dimitriadis, D. L. Sounas, N. V. Kantartzis, C. Caloz, and T. D. Tsiboukis, “Generalized surface susceptibility model for an arbitrary metasurface under oblique wave incidence,” *IEEE Trans. Antennas Propag.*, vol. 60, no. 12, pp. 5753–5767, Dec. 2012.
- [64] B. Nikfal, D. Badiere, M. Repeta, B. Deforge, S. Gupta, and C. Caloz, “Distortion-less real-time spectrum sniffing based on a stepped group-delay phaser,” *IEEE Microw. Wireless Compon. Lett.*, vol. 22, no. 11, pp. 601–603, Nov. 2012.
- [65] R. Siragusa, E. Perret, P. Lemaître-Auger, H. V. Nguyen, S. Tedjini, and C. Caloz, “A tapered CRLH interdigital/stub leaky-wave antenna with minimized side-lobe levels,” *IEEE Antennas Wirel. Propag. Lett.*, vol. 11, pp. 1214–1217, Nov. 2012.

- [66] Q. Zhang, S. Gupta, and C. Caloz, "Synthesis of narrow-band reflection-type phaser with arbitrary prescribed group delay," *IEEE Trans. Microw. Theory Tech.*, vol. 60, no. 8, pp. 2394–2402, Aug. 2012.
- [67] D. R. Jackson, C. Caloz, and T. Itoh, "Leaky-wave antennas," *Proc. IEEE*, vol. 100, no. 7, pp. 2194–2206, Jul. 2012, *invited*.
- [68] N. Chamanara, D. L. Sounas, T. Szkopek, and C. Caloz, "Optically transparent and flexible graphene reciprocal and nonreciprocal microwave planar components," *IEEE Microw. Wireless Compon. Lett.*, vol. 22, no. 7, pp. 360–362, Jul. 2012.
- [69] S. Otto, A. Al-Bassam, A. Rennings, K. Solbach, and C. Caloz, "Radiation efficiency of longitudinally symmetric and asymmetric periodic leaky-wave antennas," *IEEE Antennas Wirel. Propag. Lett.*, vol. 11, pp. 612–615, Jun. 2012.
- [70] M. Dagher, N. Chamanara, D. L. Sounas, R. Martel, and C. Caloz, "Theoretical investigation of traveling-wave amplification in metallic carbon nanotubes biased by a DC field," *IEEE Trans. Nanotech.*, vol. 11, no. 3, pp. 463–471, May 2012.
- [71] C. Caloz, "Celebration of the 60th anniversary of MTT-S," *IEEE Microw. Mag.*, vol. 13, no. 3, pp. 32–34, May 2012, *invited*.
- [72] C. Caloz, "Plenary and closing ceremonies at IMS2012," *IEEE Microw. Mag.*, vol. 13, no. 3, pp. 44–50, May 2012, *invited*.
- [73] D. L. Sounas and C. Caloz, "Gyrotropy and non-reciprocity of graphene for microwave applications," *IEEE Trans. Microw. Theory Tech.*, vol. 60, no. 4, pp. 901–914, Apr. 2012.
- [74] B. Nikfal, S. Gupta, and C. Caloz, "Low-cost and efficient pulse compression based on mixing with an auxiliary pulse," *IEEE Microw. Wireless Compon. Lett.*, vol. 22, no. 3, pp. 150–152, Mar. 2012.
- [75] S. Gupta, L.-P. Carignan, and C. Caloz, "Group delay swing enhancement in transmission-line all-pass networks using coupling and dispersion boosting ferrimagnetic substrate," *Microw. Opt. Technology Lett.*, vol. 54, no. 3, pp. 589–593, Mar. 2012.
- [76] T. Kodera, D. L. Sounas, and C. Caloz, "Non-reciprocal magnet-less CRLH leaky-wave antenna based on a ring metamaterial structure," *IEEE Antennas Wirel. Propag. Lett.*, vol. 10, pp. 1551–1554, Jan. 2012, *invited*.
- [77] Y. Horii, S. Gupta, B. Nikfal, and C. Caloz, "Multilayer broadside-coupled dispersive delay structures for analog signal processing," *IEEE Microw. Wireless Compon. Lett.*, vol. 22, no. 1, pp. 1–3, Jan. 2012.
- [78] S. Gupta, B. Nikfal, and C. Caloz, "Chipless RFID system based on group delay engineered dispersive delay structures," *IEEE Antennas Wirel. Propag. Lett.*, vol. 10, pp. 1366–1368, Dec. 2011.

- [79] D. L. Sounas and C. Caloz, "Edge surface modes in magnetically biased chemically doped graphene strips," *Appl. Phys. Lett.*, vol. 99, no. 23, pp. 231 902:1–3, Dec. 2011.
- [80] C. Caloz, "Metamaterial dispersion engineering concepts and applications," *Proc. IEEE*, vol. 99, no. 10, pp. 1711–1719, Oct. 2011, *invited*.
- [81] H. S. Skulason, H. V. Nguyen, A. Guermoune, V. Sridharan, M. Siaj, C. Caloz, and T. Szkopek, "110 GHz measurement of large-area graphene integrated in low-loss microwave structures," *Appl. Phys. Lett.*, vol. 99, no. 15, pp. 153 504:1–3, Oct. 2011.
- [82] L.-P. Carignan, A. Yelon, D. Ménard, and C. Caloz, "Ferromagnetic nanowire metamaterials: theory and applications," *IEEE Trans. Microw. Theory Tech.*, vol. 59, no. 19, pp. 2568–2586, Oct. 2011, *invited*.
- [83] S. Otto, A. Rennings, K. Solbach, and C. Caloz, "Transmission line modeling and asymptotic formulas for periodic leaky-wave antennas scanning through broadside," *IEEE Trans. Antennas Propag.*, vol. 59, no. 10, pp. 3695–3709, Oct. 2011.
- [84] N. Yang, C. Caloz, and K. Wu, "FET frequency doubler with out-of-phase switchable output and application in balanced frequency doubler," *Microw. Opt. Technology Lett.*, vol. 47, no. 5, pp. 1188–1194, Sept. 2011.
- [85] A. Shahvarpour, A. Alvarez-Melcon, and C. Caloz, "Broadband and low beam squint 2D leaky-wave antenna constituted by a uniaxially anisotropic grounded slab," *Radio Sci.*, vol. 46, no. RS4006, pp. 1–13, Aug. 2011.
- [86] H. V. Nguyen, S. Abielmona, and C. Caloz, "Performance-enhanced and symmetric full-space scanning end-switched CRLH LWA," *IEEE Antennas Wirel. Propag. Lett.*, vol. 10, pp. 709–712, Jul. 2011.
- [87] N. Yang, C. Caloz, and K. Wu, "TE<sub>210</sub> mode balanced oscillator using substrate integrated waveguide resonator," *IET Microw. Antennas Propag.*, vol. 5, no. 10, pp. 2160–2164, Jul. 2011.
- [88] T. Kodera, D. L. Sounas, and C. Caloz, "Artificial Faraday rotation using a ring metamaterial structure without static magnetic field," *Appl. Phys. Lett.*, vol. 99, no. 3, pp. 031 114:1–3, Jul. 2011.
- [89] B. Nikfal, S. Gupta, and C. Caloz, "Increased group delay slope loop system for enhanced-resolution analog signal processing," *IEEE Trans. Microw. Theory Tech.*, vol. 59, no. 6, pp. 1622–1628, Jun. 2011.
- [90] A. Parsa, A. Shahvarpour, and C. Caloz, "Double-band tunable magnetic conductor realized by a grounded ferrite slab covered with metal strip grating," *IEEE Microw. Wireless Compon. Lett.*, vol. 21, no. 5, pp. 231–233, May 2011.
- [91] S. Abielmona, H. V. Nguyen, and C. Caloz, "Analog direction of arrival estimation using an electronically-scanned CRLH leaky-wave antenna," *IEEE Trans. Antennas Propag.*, vol. 59, no. 4, pp. 1408–1412, Apr. 2011.

- [92] S. Couture, A. Parsa, and C. Caloz, “Size-independent zero-th order electric plasmonic cavity resonator,” *Microw. Opt. Technology Lett.*, vol. 54, no. 4, pp. 927–932, Apr. 2011.
- [93] N. Yang, C. Caloz, and K. Wu, “Monopulse comparator with frequency-independent delta-channel nulls for high-resolution tracking radar,” *Electron. Lett.*, vol. 47, no. 5, Mar. 2011.
- [94] A. Parsa, T. Kodera, and C. Caloz, “Ferrite based non-reciprocal radome, generalized scattering matrix analysis and experimental demonstration,” *IEEE Trans. Antennas Propag.*, vol. 59, no. 3, pp. 810–817, Mar. 2011.
- [95] R. Siragusa, E. Perret, H. V. Hoang, P. Lemaître-Auger, S. Tedjini, and C. Caloz, “Control of the sensitivity of CRLH interdigital microstrip balanced structures using a co-design genetic algorithm approach,” *Appl. Phys. A*, vol. 103, pp. 709–714, Jan. 2011.
- [96] D. L. Sounas and C. Caloz, “Electromagnetic non-reciprocity and gyrotropy of graphene,” *Appl. Phys. Lett.*, vol. 98, no. 2, pp. 021911:1–3, Jan. 2011.
- [97] A. Shahvarpour, T. Kodera, A. Parsa, and C. Caloz, “Arbitrary electromagnetic conductor boundaries using Faraday rotation in a grounded ferrite slab,” *IEEE Trans. Microw. Theory Tech.*, vol. 58, no. 11, pp. 2781–2793, Nov. 2010.
- [98] S. Couture, J. Gauthier, T. Kodera, and C. Caloz, “Experimental demonstration and potential applications of a tunable NRI ferrite-wire metamaterial,” *IEEE Antennas Wirel. Propag. Lett.*, vol. 9, pp. 1022–1025, Nov. 2010.
- [99] J. S. Gómez-Díaz, S. Gupta, A. Alvarez-Melcon, and C. Caloz, “Efficient time-domain analysis of highly-dispersive linear and non-linear metamaterial waveguide and antenna structures operated in the impulse-regime,” *IET Microw. Antennas Propag.*, vol. 4, no. 10, pp. 1617–1625, Oct. 2010.
- [100] N. Yang, C. Caloz, and K. Wu, “Full-space scanning periodic phase-reversal leaky-wave antenna,” *IEEE Trans. Microw. Theory Tech.*, vol. 58, no. 10, pp. 2619–2632, Oct. 2010.
- [101] T. Kodera and C. Caloz, “Low-profile leaky-wave electric monopole loop antenna using the  $\beta = 0$  regime of a ferrite-loaded open waveguide,” *IEEE Trans. Antennas Propag.*, vol. 58, no. 10, pp. 3165–3174, Oct. 2010.
- [102] S. Gupta, A. Parsa, E. Perret, R. V. Snyder, R. J. Wenzel, and C. Caloz, “Group delay engineered non-commensurate transmission line all-pass network for analog signal processing,” *IEEE Trans. Microw. Theory Tech.*, vol. 58, no. 9, pp. 2392–2407, Sept. 2010.
- [103] N. Yang, C. Caloz, and K. Wu, “Wideband phase-reversal antenna using a novel bandwidth enhancement technique,” *IEEE Trans. Antennas Propag.*, vol. 58, no. 9, pp. 2823–2830, Sept. 2010.



- [104] T. Kodera and C. Caloz, “Integrated leaky-wave antenna duplexer/diplexer using CRLH uniform ferrite-loaded open waveguide,” *IEEE Trans. Antennas Propag.*, vol. 58, no. 8, pp. 2508–2514, Aug. 2010.
- [105] H. V. Nguyen, A. Parsa, and C. Caloz, “Power-recycling feedback system for maximization of leaky-wave antennas radiation efficiency,” *IEEE Trans. Microw. Theory Tech.*, vol. 58, no. 7, pp. 1641–1650, Jul. 2010.
- [106] N. Yang, C. Caloz, and K. Wu, “Greater than the sum of its parts,” *IEEE Microw. Mag.*, vol. 11, no. 4, pp. 69–82, Jun. 2010.
- [107] T. Kodera and C. Caloz, “Authors’ reply,” *IEEE Trans. Microw. Theory Tech.*, vol. 58, no. 5, pp. 1310–1311, May 2010.
- [108] N. Yang, C. Caloz, and K. Wu, “Broad-band compact 180° hybrid derived from the Wilkinson divider,” *IEEE Trans. Microw. Theory Tech.*, vol. 58, no. 4, pp. 1030–1037, Apr. 2010.
- [109] M. Coulombe, S. F. Koodiani, and C. Caloz, “Compact elongated mushroom (EM)-EBG structure for enhancement of patch antenna array performances,” *IEEE Trans. Antennas Propag.*, vol. 58, no. 4, pp. 1076–1086, Apr. 2010.
- [110] S. Gupta, S. Abielmona, and C. Caloz, “Microwave analog real-time spectrum analyzer (RTSA) based on the spatial-spectral decomposition property of leaky-wave structures,” *IEEE Trans. Microw. Theory Tech.*, vol. 59, no. 12, pp. 2989–2999, Dec. 2009.
- [111] V. Boucher, L.-P. Carignan, T. Kodera, C. Caloz, A. Yelon, and D. Ménard, “Effective permeability tensor and double resonance of interacting bistable ferromagnetic nanowires,” *Phys. Rev. B*, vol. 80, pp. 224402:1–11, Dec. 2009.
- [112] J. S. Gómez-Díaz, A. Alvarez-Melcon, and C. Caloz, “Time-domain Green’s function analysis and phenomenology of impulse-regime metamaterial transmission lines,” *IEEE Trans. Antennas Propag.*, vol. 57, no. 12, pp. 4010–4014, Dec. 2009.
- [113] T. Kodera and C. Caloz, “Dual-band full-space scanning leaky-wave antenna based on ferrite-loaded open waveguide,” *IEEE Antennas Wirel. Propag. Lett.*, vol. 8, pp. 1202–1205, Nov. 2009.
- [114] S. Abielmona, S. Gupta, and C. Caloz, “Compressive receiver using a CRLH-based dispersive delay line for analog signal processing,” *IEEE Trans. Microw. Theory Tech.*, vol. 57, no. 11, pp. 2617–2626, Nov. 2009.
- [115] J. S. Gómez-Díaz, A. Alvarez-Melcon, S. Gupta, and C. Caloz, “Tunable Talbot imaging distance using an array of beam-steered metamaterial leaky-wave antennas,” *J. Appl. Phys.*, vol. 106, no. 8, pp. 084908:1–8, Oct. 2009.
- [116] L.-P. Carignan, M. Massicotte, C. Caloz, A. Yelon, and D. Ménard, “Magnetization reversal in arrays of Ni nanowires with different diameters,” *IEEE Trans. Magn.*, vol. 45, no. 10, pp. 4070–4073, Oct. 2009.

- [117] D. Erni and C. Caloz, “Introduction to the special issue functional nanophotonics and nanoelectromagnetics,” *J. Comput. Theoretical Nanoscience*, vol. 6, pp. 1977–1978, Sept. 2009, *invited*.
- [118] R. Siragusa, H. V. Nguyen, P. Lemaître-Auger, S. Tedjini, and C. Caloz, “Modeling and synthesis of the interdigital/stub composite right/left-handed artificial transmission line,” *Int. J. RF Microw. Comput. Aided Eng.*, vol. 19, no. 5, pp. 1–12, Sept. 2009.
- [119] N. Yang, C. Caloz, and K. Wu, “Lowpass filter with slow-wave rail coplanar stripline (R-CPS),” *Electron. Lett.*, vol. 45, no. 17, Aug. 2009.
- [120] Y. Xu, M. Aljerjawi, C. Caloz, K. Wu, C. Nerguizian, and R. Bosisio, “Multiple access coding interferometers in wave radio,” *IET Microw. Antennas Propag.*, vol. 3, no. 6, pp. 1007–1010, Aug. 2009.
- [121] L.-P. Carignan, V. Boucher, T. Kodera, C. Caloz, A. Yelon, and D. Ménard, “Double ferromagnetic resonance in nanowire arrays,” *Appl. Phys. Lett.*, vol. 45, no. 6, pp. 062504–1:3, Aug. 2009.
- [122] M. Coulombe and C. Caloz, “Reflection-type artificial dielectric substrate microstrip dispersive delay line (DDL) for analog signal processing,” *IEEE Trans. Microw. Theory Tech.*, vol. 57, no. 7, pp. 1714–1723, Jul. 2009.
- [123] J. S. Gómez-Díaz, S. Gupta, A. Alvarez-Melcon, and C. Caloz, “Impulse-regime CRLH resonator and its application to a tunable pulse rate multiplier,” *Radio Sci.*, vol. 44, no. RS4001, pp. 1–9, Jul. 2009.
- [124] S. Gupta and C. Caloz, “Analog signal processing in transmission line metamaterial structures,” *Radio Engineering*, vol. 18, no. 2, pp. 155–167, Jun. 2009, *invited*.
- [125] A. Parsa, R. Paknys, and C. Caloz, “Edge diffraction suppression in rectangular dielectric resonators for quality factor enhancement using artificial plasma,” *IEEE Trans. Antennas Propag.*, vol. 57, no. 9, pp. 1336–1344, May 2009.
- [126] B. E. Spielman, S. Amari, C. Caloz, G. V. Eleftheriades, T. Itoh, D. R. Jackson, R. Levy, J. D. Rhodes, and R. V. Snyder, “Metamaterials face-off,” *IEEE Microw. Mag.*, vol. 10, no. 3, pp. 8–42, May 2009, *invited*.
- [127] T. Kodera and C. Caloz, “Uniform ferrite-loaded open waveguide structure with CRLH response and its application to a novel backfire-to-endfire leaky-wave antenna,” *IEEE Trans. Microw. Theory Tech.*, vol. 57, no. 4, pp. 784–795, Apr. 2009.
- [128] J. S. Gómez-Díaz, F. D. Q. Pereira, F. J. P. Soler, J. P. Garcia, D. Cañete Rebenaque, M. M. Mendoza, J. L. G. Tornero, C. Caloz, and A. Alvarez-Melcon, “Estudio de la propagación y radiación de pulsos temporales en líneas de transmisión basadas en metamateriales CRLH,” *Telecoforum, UPCT*, vol. 8, Mar. 2009.
- [129] L.-P. Carignan, T. Kodera, D. Ménard, and C. Caloz, “Moldable polymer/ferrite composite and application to an integrated CPW tunable

- phase shifter,” *IEEE Microw. Wireless Compon. Lett.*, vol. 19, no. 4, pp. 206–208, Apr. 2009.
- [130] H. V. Nguyen, S. Abielmona, and C. Caloz, “Highly efficient leaky-wave antenna array using a power-recycling series feeding network,” *IEEE Antennas Wirel. Propag. Lett.*, vol. 8, pp. 441–444, Mar. 2009.
- [131] N. Yang, C. Caloz, and K. Wu, “Fixed-beam frequency-tunable phase reversal coplanar stripline antenna array,” *IEEE Trans. Antennas Propag.*, vol. 57, no. 3, pp. 671–681, Mar. 2009.
- [132] C. Caloz, “Perspectives on EM metamaterials,” *Materials Today*, vol. 12, no. 3, pp. 12–20, Mar. 2009, *invited*.
- [133] H. V. Nguyen and C. Caloz, “First- and second-order differentiators based on coupled-line directional couplers,” *IEEE Microw. Wireless Compon. Lett.*, vol. 18, no. 12, pp. 791–793, Dec. 2008.
- [134] A. Shahvarpour, S. Gupta, and C. Caloz, “Schroedinger solitons in left-handed SiO<sub>2</sub>-Ag-SiO<sub>2</sub> and Ag-SiO<sub>2</sub>-Ag plasmonic waveguides using non-linear transmission line approach,” *J. Appl. Phys.*, vol. 104, no. 12, pp. 124510:1–5, Dec. 2008.
- [135] J. S. Gómez-Díaz, A. Alvarez-Melcon, S. Gupta, and C. Caloz, “Spatio-temporal Talbot phenomenon using metamaterial composite right/left-handed leaky-wave antennas,” *J. Appl. Phys.*, vol. 104, no. 10, pp. 104901:1–7, Nov. 2008.
- [136] W. Tong, Z. Hu, H. Yang, H. Zhang, A. Rennings, and C. Caloz, “Study and realisation of dual-composite right/left-handed coplanar waveguide metamaterial in MMIC technology,” *IET Microw. Antennas Propag.*, vol. 2, no. 7, pp. 731–736, Oct. 2008.
- [137] C. Caloz, T. Itoh, and A. Rennings, “CRLH metamaterial leaky-wave and resonant antennas,” *IEEE Antennas Propag. Mag.*, vol. 50, no. 5, pp. 25–39, Oct. 2008, *invited*.
- [138] H. V. Nguyen and C. Caloz, “Composite right/left-handed delay line pulse position modulation transmitter,” *IEEE Microw. Wireless Compon. Lett.*, vol. 18, no. 5, pp. 527–529, Aug. 2008.
- [139] A. Rennings, J. Mosig, C. Caloz, D. Erni, and P. Waldow, “Equivalent circuit (EC) FDTD method for the modeling of surface plasmon based couplers,” *J. Comput. Theoretical Nanoscience*, vol. 5, no. 4, pp. 690–703, Apr. 2008.
- [140] R. G. Bosisio, Y. Y. Zhao, X. Y. Xu, S. Abielmona, E. Moldovan, Y. Xu, M. Bozzi, S. O. Tatu, C. Nerguizian, J. Frigon, C. Caloz, and K. Wu, “New wave radio,” *IEEE Microw. Mag.*, vol. 5, no. 4, pp. 690–703, Apr. 2008.
- [141] M. Zedler, C. Caloz, and P. Russer, “A 3-D isotropic left-handed metamaterial based on the rotated transmission-line matrix (TLM) scheme,” *IEEE Trans. Microw. Theory Tech.*, vol. 55, no. 12, pp. 2930–2941, Dec. 2007.

- [142] M. Coulombe, H. V. Nguyen, and C. Caloz, "Substrate integrated artificial dielectric (SIAD) structure for miniaturized microstrip circuits," *IEEE Antennas Wirel. Propag. Lett.*, vol. 6, pp. 575–579, Dec. 2007.
- [143] S. Abielmona, S. Gupta, and C. Caloz, "Experimental demonstration and characterization of a tunable CRLH delay line system for impulse/continuous wave," *IEEE Microw. Wireless Compon. Lett.*, vol. 17, no. 12, pp. 864–866, Dec. 2007.
- [144] N. Yang, C. Caloz, K. Wu, and Z. Chen, "Broadband and compact coupled coplanar stripline filters with impedance steps," *IEEE Trans. Microw. Theory Tech.*, vol. 55, no. 12, pp. 2874–2886, Dec. 2007.
- [145] H. V. Nguyen and C. Caloz, "Tunable arbitrary N-port CRLH infinite wavelength series power divider," *Electron. Lett.*, vol. 43, no. 23, Nov. 2007.
- [146] Y. Wang, Y. Zhang, L. He, H. Li, H. Chen, F. Liu, and C. Caloz, "Time-domain study of vortexlike interface mode in metamaterials," *Appl. Phys. Lett.*, vol. 91, no. 22, pp. 221907:1–3, Nov. 2007.
- [147] Y. Wang, Y. Zhang, F. Liu, L. He, H. Li, H. Chen, and C. Caloz, "Simplified description of asymmetric right-handed composite right/left-handed coupler in microstrip-chip technology," *Microw. Opt. Technology Lett.*, vol. 49, no. 9, pp. 2063–2068, Sept. 2007.
- [148] S. Abielmona, H. V. Nguyen, C. Caloz, K. Wu, and R. G. Bosio, "Compact multilayer ultra-wideband six-port device for modulation/demodulation," *Electron. Lett.*, vol. 43, no. 15, Jul. 2007.
- [149] H. V. Nguyen and C. Caloz, "Generalized coupled-mode approach of metamaterial coupled-line couplers: complete theory, explanation of phenomena and experimental demonstration," *IEEE Trans. Microw. Theory Tech.*, vol. 55, no. 5, pp. 1029–1039, May 2007.
- [150] C. Caloz and H. V. Nguyen, "Novel broadband conventional and dual-composite right/left-handed (C/D-CRLH) metamaterials: properties, implementation and double-band coupler application," *Appl. Phys. A*, vol. 87, no. 2, pp. 309–316, May 2007, *invited*.
- [151] C. Caloz, S. Abielmona, H. V. Nguyen, and A. Rennings, "Dual composite right/left-handed (D-CRLH) leaky-wave antenna with low beam squinting and tunable group velocity," *Phys. Stat. Solidi (b)*, vol. 244, no. 4, pp. 1219–1226, Apr. 2007, *invited*.
- [152] E.-E. Djoumessi, E. Marsan, C. Caloz, M. Chaker, and K. Wu, "Varactor-tuned dual-band quadrature hybrid coupler," *IEEE Microw. Wireless Compon. Lett.*, vol. 16, no. 11, pp. 603–605, Nov. 2006.
- [153] C. Caloz, "Dual composite right/left-handed (D-CRLH) transmission line metamaterial," *IEEE Microw. Wireless Compon. Lett.*, vol. 16, no. 11, pp. 585–587, Nov. 2006.
- [154] H. V. Nguyen and C. Caloz, "Dual-band CRLH branch-line coupler in MIM technology," *Microw. Opt. Technology Lett.*, vol. 48, no. 11, pp. 2331–2333, Nov. 2006.

- [155] I.-H. Lin, K. M. K. H. Leong, C. Caloz, and T. Itoh, "Dual-band sub-harmonic quadrature mixer using composite right/left-handed transmission lines," *IET Microw. Antennas Propag.*, vol. 153, no. 4, pp. 365–375, Aug. 2006.
- [156] F. P. Casares-Miranda, C. Camacho-Peñalosa, and C. Caloz, "High-gain active composite right/left-handed leaky-wave antenna," *IEEE Trans. Antennas Propag.*, vol. 54, no. 8, pp. 2292–2300, Aug. 2006.
- [157] F. P. Casares-Miranda, C. Viereck, C. Camacho-Peñalosa, and C. Caloz, "Vertical microstrip transition for multilayer microwave circuits with decoupled passive and active layers," *IEEE Microw. Wireless Compon. Lett.*, vol. 16, no. 7, pp. 401–403, Jul. 2006.
- [158] A. Rennings, S. Otto, W. Bilgic, A. Lauer, C. Caloz, and P. Waldow, "Composite right/left-handed extended equivalent circuit finite-difference time-domain (CRLH-EEC FDTD) method: stability and dispersion analysis with examples," *Int. J. Numer. Modell. Electron. Networks Devices Fields*, vol. 19, no. 2, pp. 141–172, Mar. 2006.
- [159] C. Caloz, "Introduction to the special issue numerical modelling of metamaterial properties, structures and devices," *Int. J. Numer. Modell. Electron. Networks Devices Fields*, vol. 19, pp. 83–85, Mar. 2006, *invited*.
- [160] H. V. Nguyen and C. Caloz, "Broadband highly selective bandpass filter based on a tapered coupled-resonator (TCR) CRLH structure," *J. European Microw. Ass.*, vol. 2, pp. 44–51, Mar. 2006.
- [161] A. Rennings, S. Otto, A. Lauer, C. Caloz, and P. Waldow, "An extended equivalent circuit based FDTD scheme for the efficient simulation of composite right/left-handed metamaterials," *J. European Microw. Ass.*, vol. 2, pp. 71–82, Mar. 2006.
- [162] C. Caloz and T. Itoh, "Metamaterials for high-frequency electronics," *Proc. IEEE*, vol. 93, no. 10, pp. 1744–1752, Oct. 2005, *invited*.
- [163] T. Fujishige, C. Caloz, and T. Itoh, "Experimental demonstration of transparency in ENG-MNG pair in a CRLH transmission-line implementation," *Microw. Opt. Technology Lett.*, vol. 46, no. 5, pp. 476–481, Sept. 2005.
- [164] C. Caloz, A. Lai, and T. Itoh, "The challenge of homogenization in metamaterials," *New J. Phys.*, vol. 7, no. 167, pp. 1–15, Aug. 2005, *invited*.
- [165] Y. Horii, C. Caloz, and T. Itoh, "Super-compact multilayered left-handed transmission line and diplexer application," *IEEE Trans. Microw. Theory Tech.*, vol. 53, no. 4, pp. 1527–1534, Apr. 2005.
- [166] I.-H. Lin, C. Caloz, and T. Itoh, "Near-field focusing by a nonuniform leaky-wave interface," *Microw. Opt. Technology Lett.*, vol. 44, no. 5, pp. 416–418, Mar. 2005.
- [167] S. Lim, C. Caloz, and T. Itoh, "Metamaterial-based electronically controlled transmission line structure as a novel leaky-wave antenna with tunable angle and beamwidth," *IEEE Trans. Microw. Theory Tech.*, vol. 53, no. 1, pp. 161–173, Dec. 2005.

- [168] C. Caloz and T. Itoh, "Lossy transmission line metamaterials," *Microw. Opt. Technology Lett.*, vol. 43, no. 2, pp. 112–114, Oct. 2004.
- [169] T. Fujishige, C. Caloz, and T. Itoh, "Analytical expressions for the composite right/left-handed transmission lines based on the Mittag-Leffler series expansion," *Microw. Opt. Technology Lett.*, vol. 43, no. 1, pp. 26–29, Oct. 2004.
- [170] A. Lai, C. Caloz, and T. Itoh, "Composite right/left-handed transmission line metamaterials," *IEEE Microw. Mag.*, vol. 5, no. 3, pp. 34–50, Sept. 2004, *invited*.
- [171] C. Caloz and T. Itoh, "Array factor approach of leaky-wave antennas and application to 1D/2D composite right/left-handed (CRLH) structures," *IEEE Microw. Wireless Compon. Lett.*, vol. 14, no. 6, pp. 274–276, Jun. 2004.
- [172] S. Lim, C. Caloz, and T. Itoh, "Electronically-scanned composite right/left-handed microstrip leaky-wave antenna," *IEEE Microw. Wireless Compon. Lett.*, vol. 14, no. 6, pp. 277–279, Jun. 2004.
- [173] C. Caloz and T. Itoh, "Transmission line approach of left-handed (LH) structures and microstrip implementation of an artificial LH transmission line," *IEEE Trans. Antennas Propag.*, vol. 52, no. 5, pp. 1159–1166, May 2004.
- [174] S. Lim, C. Caloz, and T. Itoh, "A reflecto-directive system using a composite right/left-handed (CRLH) leaky-wave antenna and heterodyne mixing," *IEEE Microw. Wireless Compon. Lett.*, vol. 14, no. 4, pp. 183–185, Apr. 2004.
- [175] C. Caloz, H. Okabe, T. Iwai, and T. Itoh, "A simple and accurate model for microstrip structures with slotted ground plane," *IEEE Microw. Wireless Compon. Lett.*, vol. 14, no. 3, pp. 127–129, Mar. 2004.
- [176] A. Sanada, C. Caloz, and T. Itoh, "Planar distributed structures with negative refractive index," *IEEE Trans. Microw. Theory Tech.*, vol. 52, no. 4, pp. 1252–1263, Apr. 2004.
- [177] I.-H. Lin, M. D. Vincentis, C. Caloz, and T. Itoh, "Arbitrary dual-band components using composite right/left-handed transmission lines," *IEEE Trans. Microw. Theory Tech.*, vol. 52, no. 4, pp. 1142–1149, Apr. 2004.
- [178] C. Caloz, A. Sanada, and T. Itoh, "A novel composite right/left-handed coupled-line directional coupler with arbitrary coupling level and broad bandwidth," *IEEE Trans. Microw. Theory Tech.*, vol. 52, no. 3, pp. 980–992, Mar. 2004.
- [179] H. Okabe, C. Caloz, and T. Itoh, "A compact enhanced-bandwidth hybrid ring using an artificial lumped-element left-handed transmission-line section," *IEEE Trans. Microw. Theory Tech.*, vol. 52, no. 3, pp. 798–804, Mar. 2004.

- [180] C. Caloz, I.-H. Lin, and T. Itoh, "Characteristics and potential applications of nonlinear left-handed transmission lines," *Microw. Opt. Technology Lett.*, vol. 40, no. 6, pp. 471–473, Mar. 2004.
- [181] A. Sanada, C. Caloz, and T. Itoh, "Characteristics of the composite right/left-handed transmission lines," *IEEE Microw. Wireless Compon. Lett.*, vol. 14, no. 6, pp. 68–70, Feb. 2004.
- [182] C. Caloz and T. Itoh, "A novel mixed conventional microstrip and composite right/left-handed backward-wave directional coupler with broadband and tight coupling characteristics," *IEEE Microw. Wireless Compon. Lett.*, vol. 14, no. 1, pp. 31–33, Jan. 2004.
- [183] A. Sanada, C. Caloz, and T. Itoh, "Zeroth order resonance in the left-handed transmission line," *IEICE Trans. Electron.*, vol. 87-C, no. 1, pp. 1–7, Jan. 2004.
- [184] C. Caloz and T. Itoh, "Positive / negative refractive index anisotropic 2D metamaterials," *IEEE Microw. Wireless Compon. Lett.*, vol. 13, no. 12, pp. 547–549, Dec. 2003.
- [185] L. Liu, C. Caloz, C.-C. Chang, and T. Itoh, "Forward coupling phenomena between artificial left-handed (LH) transmission lines," *J. Appl. Phys.*, vol. 92, no. 9, pp. 5560–5565, Nov. 2002.
- [186] L. Liu, C. Caloz, and T. Itoh, "Dominant mode (DM) leaky-wave antenna with backfire-to-endfire scanning capability," *Electron. Lett.*, vol. 38, no. 23, pp. 1414–1416, Nov. 2002.
- [187] C. Caloz and T. Itoh, "Multilayer and anisotropic planar compact photonic bandgap (PBG) structures for microstrip applications," *IEEE Trans. Microw. Theory Tech.*, vol. 50, no. 9, pp. 2206–2208, Sept. 2002.
- [188] C. Caloz, A. K. Skrivervik, and F. E. Gardiol, "An efficient method to determine Green's functions of a two-dimensional photonic crystal excited by a line source: the phased array method," *IEEE Trans. Microw. Theory Tech.*, vol. 50, no. 5, pp. 1380–1391, May 2002.
- [189] J.-Y. Park, C. Caloz, Y. Qian, and T. Itoh, "A compact circularly polarized subdivided microstrip patch antenna," *IEEE Microw. Wireless Compon. Lett.*, vol. 12, no. 1, pp. 18–19, Jan. 2002.
- [190] C. Caloz, C.-C. Chang, and T. Itoh, "Full-wave verification of the fundamental properties of left-handed materials (LHMs) in waveguide configurations," *J. Appl. Phys.*, vol. 90, no. 11, pp. 5483–5486, Dec. 2001.
- [191] C. Caloz, "Green's functions in a PC-PPWG structure," *Microw. Opt. Technology Lett.*, vol. 26, no. 6, pp. 405–408, Jun. 2001.
- [192] C. Caloz, A. K. Skrivervik, and F. E. Gardiol, "Comparison of two methods for the computation of Green's functions in photonic bandgap materials: the eigenmodes expansion method and the phased array method," *Microw. Opt. Technology Lett.*, vol. 27, no. 5, pp. 323–330, Dec. 2000.

- [193] C. Caloz, A. K. Skrivervik, and F. E. Gardiol, “Electromagnetic radiation in two-dimensional photonic crystals with sinusoidal and sharp permittivity profiles,” *Microw. Opt. Technology Lett.*, vol. 24, no. 5, pp. 316–322, Mar. 2000.



## Conference Papers and Workshop Presentations

- [194] X. Wang, L. Zou, and C. Caloz, “Tunable C-section phaser for dynamic analog signal processing,” in *URSI General Assembly and Scientific Symposium(GASS)*, Montréal, QC, Aug. 2017.
- [195] M. Klissarov, L. Zou, and C. Caloz, “Real-time narrow-band frequency-shift keying (FSK) receiver,” in *URSI General Assembly and Scientific Symposium(GASS)*, Montréal, QC, Aug. 2017.
- [196] N. Chamanara and C. Caloz, “Electromagnetic nonreciprocity, amplification and mixing in dispersion-engineered space-time systems,” in *URSI General Assembly and Scientific Symposium(GASS)*, Montréal, QC, Aug. 2017.
- [197] K. Achouri and C. Caloz, “Recent development in metasurface design and applications,” in *URSI General Assembly and Scientific Symposium(GASS)*, Montréal, QC, Aug. 2017.
- [198] A. Akbarzadeh and C. Caloz, “Force tracing and its application in optical manipulation,” in *URSI General Assembly and Scientific Symposium(GASS)*, Montréal, QC, Aug. 2017.
- [199] Z.-L. Deck-Léger, N. Chamanara, M. Skorobogatiy, and C. Caloz, “Space-time (ST) reflection focusing in dispersion-engineered medium,” in *URSI General Assembly and Scientific Symposium(GASS)*, Montréal, QC, Aug. 2017.
- [200] L. Zou and C. Caloz, “Characterization of dispersion code multiplexing (DCM) in incoherent radio channels,” in *URSI General Assembly and Scientific Symposium(GASS)*, Montréal, QC, Aug. 2017.
- [201] A. Akbarzadeh, “Force tracing: a method to sculpt the optical force,” in *Opt. Trapping Opt. Micromanipulation XIV, SPIE Conf. Nanoscience Engr.*, San Diego, CA, Aug. 2017, *to be published*.
- [202] C. Caloz, Z.-L. Deck-Léger, and N. Chamanara, “Towards space-time metamaterials,” in *Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Marseille, France, Aug. 2017, *invited to be published*.
- [203] K. Achouri and C. Caloz, “Scattering from a nonlinear metasurface,” in *Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Marseille, France, Aug. 2017, *to be published*.
- [204] Z.-L. Deck-Léger and C. Caloz, “Sub/super-luminal space-time slab: fundamental scattering symmetries,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 813–814.
- [205] Z.-L. Deck-Léger and C. Caloz, “Scattering in superluminal space-time (ST) modulated electromagnetic crystals,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 63–64.
- [206] K. Achouri and C. Caloz, “Metasurface solar sail,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 1057–1058.

- [207] K. Achouri and C. Caloz, “Controllable angular scattering with a bianisotropic metasurface,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 1489–1490.
- [208] X. Wang and C. Caloz, “Phaser-based polarization-dispersive antenan and application to encrypted communication,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 2187–2188.
- [209] L. Zou and C. Caloz, “Characterization of dispersion code multiplexing (DCM) in wireless indoor environment,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 931–932.
- [210] G. Lavigne, K. Achouri, V. Asadchy, S. Tretyakov, and C. Caloz, “Perfectly refractive metasurface using bianisotropy,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 1713–1714.
- [211] G. Lavigne and C. Caloz, ““Phasenna” based on a metasurface system,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 1941–1942.
- [212] L. Chen, K. Achouri, C. Caloz, and E. Kallos, “Manipulating light in nanophotonics devices using double-metasurface cavity,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 879–880.
- [213] Y. Vahabzadeh and C. Caloz, “Field moving metasurface,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 1717–1718.
- [214] Y. Vahabzadeh, N. Chamanara, and C. Caloz, “Simulation of space-time varying metasurface using finite-difference time-domain technique,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 441–442.
- [215] N. Chamanara and C. Caloz, “Electromagnetic wave amplification based on dispersion engineered intraband photonic transitions,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 53–54.
- [216] N. Chamanara, S. Taravati, Z.-L. Deck-Léger, and C. Caloz, “Electromagnetic nonreciprocity and perfect mixing in space-time engineered asymmetric bandgaps,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2017, pp. 443–444.
- [217] C. Caloz, K. A. an G. Lavigne, Y. Vahabzadeh, L. Chen, S. Taravati, and N. Chamanara, “A guided tour in metasurface land: discontinuity conditions, design and applications,” in *IEEE AP-S Int. Topical Meeting on Computational Electromagnetics (ICCEM)*, Kumamoto, Japan, Mar. 2017, pp. 310–311, *invited*.
- [218] C. Caloz, “Spacetime metamaterial engineering,” in *Metamaterials’2016, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Crete, Greece, Sept. 2016, pp. 883–885.
- [219] K. Achouri and C. Caloz, “Surface wave routing of beams by a transparent birefringent metasurface,” in *Metamaterials’2016, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Crete, Greece, Sept. 2016, pp. 563–565.

- [220] C. Caloz and S. Tretyakov, “Nonreciprocal metamaterials: a global perspective,” in *Metamaterials’2016, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Crete, Greece, Sept. 2016, pp. 431–433.
- [221] N. Chamanara, Y. Vahabzadeh, K. Achouri, and C. Caloz, “Exact polychromatic metasurface design: the GSTC approach,” in *Metamaterials’2016, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Crete, Greece, Sept. 2016, pp. 294–296.
- [222] Q. Zhang, T. Guo, Y. Chen, and C. Caloz, “Design of broadband low-pass reflective phasers,” in *URSI Asia-Pacific Radio Science Conf.*, Seoul, Korea, Aug. 2016, pp. 1769–1772.
- [223] C. Caloz, “Ten applications of metamaterials,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 1299–1300, *invited*.
- [224] S. Gupta and C. Caloz, “Parity-time (PT) symmetry properties of natural and perfect dispersive media,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 1519–1520, *invited*.
- [225] L. Zou, S. Gupta, and C. Caloz, “Dispersion code modulation for enhanced spectral efficiency in wireless communications,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 1851–1852.
- [226] A. Al-Bassam, S. Otto, and C. Caloz, “Dual-channel radiation using a single double-asymmetric periodic leaky-wave antenna,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 2159–2160.
- [227] Y. Vahabzadeh and C. Caloz, “GSTC-based simulation of metasurfaces in finite difference techniques,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 373–374.
- [228] K. Achouri, B. A. Khan, C. Caloz, V. Asadchy, and S. Tretyakov, “Synthesis of nongyrotropic nonreciprocal metasurface as an equivalent moving medium,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 371–372, *invited*.
- [229] K. Achouri and C. Caloz, “Metasurface diffraction orders analysis,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 1081–1082.
- [230] W. Liao, Q. Zhang, Y. Chen, W. Rui, and C. Caloz, “Phaser-based feeding network for axial ratio bandwidth enhancement in circularly polarized antennas,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 1597–1597.
- [231] N. Nguyen-Trong, C. Fumeaux, S. Gupta, and C. Caloz, “Pulse radiation from a leaky-wave antenna,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 87–88.

- [232] Z.-L. Deck-Léger, M. Skorobogatiy, and C. Caloz, “Diagrammatic explanation of the reverse Doppler effect in space-time modulated photonic crystals,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 2101–2102.
- [233] N. Chamanara, Y. Vahabzadeh, K. Achouri, and C. Caloz, “Spacetime processing metasurfaces: GSTC synthesis and prospective applications,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 365–366.
- [234] N. Chamanara and C. Caloz, “PML inspired transparent metamaterials,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Fajaro, Puerto Rico, Jun. 2016, pp. 109–110.
- [235] C. Caloz, K. Achouri, Y. Vahabzadeh, and N. Chamanara, “Spacetime metasurfaces: new frontiers in optics with two-dimensional structured sheets,” in *Photonic North’2016*, Québec, Canada, May 2016, *invited*.
- [236] H. Qu, M. Skorobogatiy, and Z.-L. Deck-Léger, “Frequency generation in a moving 2-dimensional photonic crystal,” in *Photonic North’2016*, Québec, Canada, May 2016.
- [237] C. Caloz, “Tomorrow’s metamaterials: manipulation of electromagnetic waves in space, time and spacetime,” in *European Conf. Antennas Propag. (EuCAP)*, Davos Switzerland, Apr. 2016, *invited*.
- [238] N. Chamanara and C. Caloz, “Electromagnetic spectrum transformation in space-time modulated and dispersion engineered graphene surface plasmons,” in *European Conf. Antennas Propag. (EuCAP)*, Davos Switzerland, Apr. 2016, *invited*.
- [239] L. Zou, S. Gupta, and C. Caloz, “Reconfigurable phaser using gain-loss c-sections for radio analog signal processing (R-ASP),” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Nanjing, China, Dec. 2015.
- [240] C. Caloz, “A ten-year journey in leaky-wave antennas,” in *IEEE Conf. on Antenna Measurement and Applications (CAMA)*, Chiang Mai, Thailand, Dec. 2015, *invited* (keynote talk).
- [241] S. Gupta, K. Achouri, and C. Caloz, “All-pass metasurfaces based on interconnected dielectric resonators as a spatial phaser for real-time analog signal processing,” in *IEEE Conf. on Antenna Measurement and Applications (CAMA)*, Chiang Mai, Thailand, Dec. 2015.
- [242] K. Achouri, M. A. Salem, and C. Caloz, “Electromagnetic metasurface performing up to four independent wave transformations,” in *IEEE Conf. on Antenna Measurement and Applications (CAMA)*, Chiang Mai, Thailand, Dec. 2015, *invited*.
- [243] C. Caloz, “Metamaterial-based electromagnetic space, time and space-time dispersion engineering,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Hobart, Australia, Nov. 2015, *invited*.
- [244] N. Chamanara and C. Caloz, “Nonreciprocal graphene magnetoplasmons: latest advances,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Hobart, Australia, Nov. 2015, pp. 624–626.

- [245] L. Zou, S. Gupta, and C. Caloz, "Time-reversal based routing in dispersion code multiple access (DCMA)," in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Hobart, Australia, Nov. 2015, pp. 366–369.
- [246] W. Dyab, C. Caloz, and S. Otto, "Interpretation of complex frequencies in propagation problems," in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Hobart, Australia, Nov. 2015, pp. 337–340.
- [247] R. Zang, C. Caloz, and Q. Zhang, "Relay multiplexing enhancement using a nonreciprocal antenna array," in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Hobart, Australia, Nov. 2015, pp. 271–273.
- [248] B. A. Khan, S. Gupta, and C. Caloz, "Spatial nonreciprocal and nongyrotropic structure," in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Hobart, Australia, Nov. 2015, pp. 154–157.
- [249] K. Achouri, M. A. Salem, and C. Caloz, "Improvement of metasurface continuity conditions," in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Hobart, Australia, Nov. 2015, pp. 123–125.
- [250] K. Achouri, M. A. Salem, and C. Caloz, "Transistor metasurface," in *Metamaterials'2015, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Oxford, England, Sept. 2015.
- [251] M. A. Salem, K. Achouri, C. Caloz, E. Kallos, and G. Palikaras, "Cavity-backed non-uniform partially reflective metasurface (PRM) for enhanced directivity and power extraction," in *Metamaterials'2015, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Oxford, England, Sept. 2015.
- [252] S. Taravati and C. Caloz, "Versatile phasers constituted of coupling-free nonuniform stub-loaded transmission lines," in *IEEE European Microwave Conf. (EuMC)*, Paris, France, Sept. 2015, pp. 359–362.
- [253] S. Gupta and C. Caloz, "Multi-dimensional real-time spectrum analysis for high-resolution signal processing," in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2015, pp. 1412–1415, *invited*.
- [254] M. Salem and C. Caloz, "Temporal photonic crystals: causality versus periodicity," in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2015, pp. 489–493, *invited*.
- [255] N. Chamanara and C. Caloz, "Efficient numerical modelling of a special class of photonic crystals using the tight binding approach," in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 191–192, *invited*.
- [256] N. Chamanara and C. Caloz, "Magnetless ring circulator based on non-reciprocal phasers," in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 1628–1629.
- [257] G. Zhang, Q. Zhang, F. Yang, Y. Chen, C. Caloz, and R. D. Murch, "Phaser-based feeding network for uniformly scanning antenna arrays," in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 236–237.

- [258] S. Gupta, L. Zou, and C. Caloz, “Bit-Error-Rate (BER) performance in Dispersion Code Multiple Access (DCMA),” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 1015–1016.
- [259] S. Gupta and C. Caloz, “Real-time 2-D spectral-decomposition using a leaky-wave antenna array with dispersive feeding network,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 29–30.
- [260] K. Achouri, M. A. Salem, and C. Caloz, “Birefringent “generalized refractive” metasurface,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 878–879.
- [261] M. A. Salem and C. Caloz, “A complete expansion set for free-space Green function using Kontorovich-Lebedev transform,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 1618–1619.
- [262] M. A. Salem and C. Caloz, “Launching OAM-carrying waves by a leaky circular current loop,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 1066–1067.
- [263] M. A. Salem and C. Caloz, “Scattering similarities and differences in space and time discontinuous media,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 1624–1625.
- [264] S. Taravati and C. Caloz, “Space-time modulated nonreciprocal mixing, amplifying and scanning leaky-wave antenna system,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 639–640.
- [265] Z.-L. Deck-Léger, M. A. Salem, and C. Caloz, “X wave transformation under time discontinuity,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Vancouver, BC, Jul. 2015, pp. 1120–1121.
- [266] S. Gupta and C. Caloz, “2-D real-time spectrum analysis,” in *Photonic North’2015*, Ottawa, Canada, Jun. 2015.
- [267] M. A. Salem, K. Achouri, and C. Caloz, “Birefringent metasurface synthesis for vortex wave generation,” in *Photonic North’2015*, Ottawa, Canada, Jun. 2015.
- [268] N. Chamanara and C. Caloz, “Magnetless graphene-ferrite infrared plasmonic isolator,” in *Photonic North’2015*, Ottawa, Canada, Jun. 2015.
- [269] S. Otto and C. Caloz, “Solving the broadside radiation issue in periodic leaky-wave antennas,” in *Asia-Pacific Conf. on Antennas and Propagation (APCAP)*, Bali, Indonesia, Jun. 2015.
- [270] W. Liao, Q. Zhang, Y. Chen, and C. Caloz, “Phaser-based feeding network for axial ratio bandwidth enhancement in circularly polarized antennas,” in *Asia-Pacific Conf. on Antennas and Propagation (APCAP)*, Bali, Indonesia, Jun. 2015.
- [271] C. Caloz, “Novel space, time and space-time processing materials and devices for RF-THz applications,” in *IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP 2015)*, Suzhou, China, Jun. 2015.

- [272] N. Chamanara and C. Caloz, “Magnetically switchable graphene coupler and application to a magnetic probe,” in *IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP 2015)*, Suzhou, China, Jun. 2015.
- [273] M. A. Salem and C. Caloz, “Scattering in spatiotemporal media,” in *IEEE MTT-S International Microwave Workshop Series on Advanced Materials and Processes for RF and THz Applications (IMWS-AMP 2015)*, Suzhou, China, Jun. 2015.
- [274] M. A. Salem and C. Caloz, “Metasurface non-reciprocity engineering,” in *URSI Atlantic Radio Science Conf.*, Gran Canaria, Spain, May 2015.
- [275] Q. Zhang and C. Caloz, “Synthesis of nonreciprocal lossless two-port networks using coupling matrix techniques,” in *URSI Atlantic Radio Science Conf.*, Gran Canaria, Spain, May 2015.
- [276] M. A. Salem and C. Caloz, “Sub-cycle time-varying electromagnetic systems,” in *URSI Atlantic Radio Science Conf.*, Gran Canaria, Spain, May 2015.
- [277] N. Chamanara and C. Caloz, “Graphene magnetoplasmonic principles, structures and devices,” in *European Conf. Antennas Propag. (EuCAP)*, Lisbon, Portugal, Apr. 2015, *invited*.
- [278] M. A. Salem and C. Caloz, “Wave propagation in periodic temporal slabs,” in *European Conf. Antennas Propag. (EuCAP)*, Lisbon, Portugal, Apr. 2015.
- [279] K. Achouri, M. A. Salem, and C. Caloz, “Minimization of metasurface susceptibility range by optimizing the longitudinal phase and polarization angle,” in *European Conf. Antennas Propag. (EuCAP)*, Lisbon, Portugal, Apr. 2015.
- [280] B. Gurlek and C. Caloz, “Towards reflection-less or total reflection magnet-less nonreciprocal metasurface,” in *European Conf. Antennas Propag. (EuCAP)*, Lisbon, Portugal, Apr. 2015.
- [281] S. Gupta, B. A. Khan, and C. Caloz, “Forward and backward coupled ring based electromagnetic phasers,” in *European Conf. Antennas Propag. (EuCAP)*, Lisbon, Portugal, Apr. 2015.
- [282] A. Al-Bassam, S. Otto, and C. Caloz, “Role of symmetries in periodic leaky-wave antennas, with emphasis on the double-asymmetry case,” in *European Conf. Antennas Propag. (EuCAP)*, Lisbon, Portugal, Apr. 2015.
- [283] C. Caloz, “Electromagnetic space, time and space-time processing for mmw and thz technology,” in *IEEE AP-S Int. Topical Meeting on Computational Electromagnetics (ICCEM)*, Hong Kong, China, Feb. 2015, pp. 16–18, *invited*.

- [284] S. Taravati, Q. Zhang, and C. Caloz, “Non-uniform C-section phasers for enhanced design flexibility in radio analog signal processing,” in *IEEE European Microw. Conf. (EuMC)*, Rome, Italy, Oct. 2014, pp. 21–24.
- [285] C. Caloz, K. Achouri, and M. A. Salem, “Metasurfaces for moulding waves: synthesis and implementation roads,” in *Metamaterials’2014, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Copenhagen, Denmark, Aug. 2014, *invited*.
- [286] K. Achouri, M. A. Salem, and C. Caloz, “Metasurface synthesis assuming reduced susceptibility tensors,” in *Metamaterials’2014, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Copenhagen, Denmark, Aug. 2014.
- [287] N. Chamanara and C. Caloz, “Multiphysics modeling of a triple-scale graphene sheet - magnetic nanowire - FSS gyrotropic metasurface,” in *URSI General Assembly and Scientific Symposium(GASS)*, Beijing, China, Aug. 2014, *invited*.
- [288] N. Chamanara and C. Caloz, “Graphene magnetoplasmons in periodic magnetic field,” in *URSI General Assembly and Scientific Symposium(GASS)*, Beijing, China, Aug. 2014, *invited*.
- [289] M. Salem and C. Caloz, “Metasurface synthesis using momentum transformation,” in *URSI General Assembly and Scientific Symposium(GASS)*, Beijing, China, Aug. 2014, *invited*.
- [290] Q. Zhang and C. Caloz, “Synthesis of phasers for real-time analog signal processing,” in *URSI General Assembly and Scientific Symposium(GASS)*, Beijing, China, Aug. 2014, *invited*.
- [291] Q. Zhang and C. Caloz, “Synthesis of phasers for real-time signal processing using filter techniques,” in *Progress in Electromagnetics Research Symp. (PIERS)*, Guangzhou, China, Aug. 2014.
- [292] C. Caloz, “New horizons in metasurfaces: non-reciprocity and vorticity,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Aruba, Aug. 2014, pp. 640–642, *invited*.
- [293] C. Caloz and S. Otto, “The symmetry secrets of periodic leaky-wave antennas,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Aruba, Aug. 2014, pp. 643–645, *invited*.
- [294] S. Gupta, C. Caloz, and L. J. Jiang, “Traveling-wave antennas with exotic radiation patterns,” in *IEEE-APS Topical Conference on Antennas Propagat. Wireless Comm.*, Aruba, Aug. 2014, pp. 608–611, *invited*.
- [295] T. Szkopek, C. Caloz, and H. S. Skulason, “Large area graphene electromagnetic devices,” in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Victoria, Canada, Jul. 2014, *invited*.
- [296] N. Chamanara, T. Szkopek, and C. Caloz, “Terahertz graphene magnetoplasmons: non-reciprocity, tunability and gyrotropy,” in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Victoria, Canada, Jul. 2014, *invited*.



- [297] C. Caloz, “Radio analog signal processing: for millimeter-wave and terahertz applications,” in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Victoria, Canada, Jul. 2014, *invited*.
- [298] N. Chamanara and C. Caloz, “Multiscale and multiphysics graphene sheet – magnetic nanowire gyrotropic metamaterial,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Memphis, TN, Jul. 2014, pp. 888–889.
- [299] L. Zou and C. Caloz, “Concept of combined phaser-antenna – “phasenna” ? – for wireless radio analog signal processing (R-ASP),” in *IEEE AP-S Int. Antennas Propag. (APS)*, Memphis, TN, Jul. 2014, pp. 822–823.
- [300] S. Gupta, L. J. Jiang, and C. Caloz, “Reduced-permittivity meandered single-beam full-space scanning phase-reversal leaky-wave antenna,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Memphis, TN, Jul. 2014, pp. 63–64.
- [301] M. A. Salem and C. Caloz, “Propagation-invariant beam launching metasurface,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Memphis, TN, Jul. 2014, pp. 1220–1221, *invited*.
- [302] A. Al-Bassam, M. A. Salem, and C. Caloz, “Vortex beam generation using circular leaky-wave antenna,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Memphis, TN, Jul. 2014, pp. 1792–1793.
- [303] L. Zou, Q. Zhang, and C. Caloz, “High-resolution transmission-type (TT) dispersive delay structure (DDS) based on reflection-type (RT) elements,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Tampa Bay, FL, Jun. 2014.
- [304] M. A. Salem and C. Caloz, “Metasurface synthesis using momentum transformation,” in *META ’14*, Singapore, May 2014, *invited*.
- [305] T. Kodera and C. Caloz, “Tunable magnetless non-reciprocal metamaterials and their application to circulators,” in *META ’14*, Singapore, May 2014, *invited*.
- [306] N. Chamanara and C. Caloz, “Non-reciprocal graphene magnetoplasmons: terahertz components and devices,” in *META ’14*, Singapore, May 2014, *invited*.
- [307] N. Chamanara and C. Caloz, “Tunable terahertz graphene magnetoplasmons: non-reciprocal components and applications,” in *European Conf. Antennas Propag. (EuCAP)*, The Hague, Netherlands, Apr. 2013, pp. 488–489, *invited*.
- [308] C. Caloz and S. Otto, “A tour on recent developments and discoveries of crucial practical importance in leaky-wave antennas,” in *IEEE European Microw. Conf. (EuMC)*, Nuremberg, Germany, Oct. 2013, pp. 495–498, *invited*.
- [309] C. Caloz, T. Kodera, and D. L. Sounas, “Semiconductor-based non-reciprocal gyrotropic metamaterials requiring no external magnetic field,” in *Metamaterials’2013, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Bordeaux, France, Sept. 2013, *invited*.

- [310] C. Caloz, D. L. Sounas, L.-P. Carignan, H. Zhan, and N. Chamanara, “Transparent graphene-based non-reciprocal devices magnetically biased with ferromagnetic nanowire metamaterials and electrically biased with frequency selective surfaces,” in *Metamaterials’2014, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Bordeaux, France, Sept. 2013.
- [311] M. A. Salem and C. Caloz, “Precision orbital angular momentum (OAM) multiplexing communication using a metasurface,” in *Metamaterials’2014, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Bordeaux, France, Sept. 2013.
- [312] B. Gurlek, D. L. Sounas, and C. Caloz, “Enhancing the transparency of gyrotropic magnet-less non-reciprocal metamaterials (MNM)s using slot pair particles,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2013, pp. 1481–1484, *invited*.
- [313] S. Gupta, L. J. Jiang, and C. Caloz, “Enhanced-resolution folded C-section phaser,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2013, pp. 771–773.
- [314] S. Gupta, L. J. Jiang, and C. Caloz, “Magneto-electric dipole antenna based on differentially-excited composite right/left-handed (CRLH) transmission lines,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2013, pp. 765–766.
- [315] N. Chamanara and C. Caloz, “Hybrid spatial-spectral integral equation for periodic guided wave problems and applications to magnetoplasmonics in graphene,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2013, pp. 247–249.
- [316] C. Caloz, “Electromagnetic metamaterials: a new paradigm for the 21st century,” in *Int. Conf. on Infrared and Millim. Waves and THz (IRMMW-THz)*, Mainz on the Rhine, Germany, Sept. 2013, *invited* (plenary talk).
- [317] T. Kodera, D. L. Sounas, and C. Caloz, “Magnet-less non-reciprocal metamaterials,” in *Progress in Electromagnetics Research Symp. (PIERS)*, Stockholm, Sweden, Aug. 2013.
- [318] N. Chamanara and C. Caloz, “Integral equation for guided-wave problems and application to magneto-plasmonics in graphene,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Lake Buena Vista, FL, Jul. 2013, pp. 732–733.
- [319] S. Otto and C. Caloz, “Importance of transversal and longitudinal symmetry/asymmetry in the fundamental properties of periodic leaky-wave antennas,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Lake Buena Vista, FL, Jul. 2013, pp. 240–241, *invited*.
- [320] D. L. Sounas, C. Caloz, and A. Alù, “Non-reciprocal metamaterials with angular momentum biasing,” in *CNC/USNC URSI National Radio Science Meeting*, Lake Buena Vista, FL, Jul. 2013.

- [321] B. Gurlek, D. L. Sounas, and C. Caloz, “Deficiency of the conventional polarizability concept for dense composite materials,” in *CNC/USNC URSI National Radio Science Meeting*, Lake Buena Vista, FL, Jul. 2013.
- [322] T. Szkopek, H. S. Skulasson, D. L. Sounas, H. V. Nguyen, A. Guermoune, M. Siaj, and C. Caloz, “Magnetoconductance and Faraday rotation in graphene at microwave frequencies,” in *Graphene Week*, Chemnitz, Germany, Jun. 2013.
- [323] T. Kodera and C. Caloz, “Multi-function reconfigurable microwave component based on a switchable FET circuit,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Seattle, WA, Jun. 2013.
- [324] D. L. Sounas, H. S. Skulason, T. Szkopek, and C. Caloz, “Graphene non-reciprocal electromagnetic activity at microwave frequencies,” in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Hiroshima, Japan, May 2013, pp. 1074–1077, *invited*.
- [325] C. Caloz, A. Shahvarpour, D. L. Sounas, T. Kodera, B. Gurlek, and N. Chamanara, “Practical realization of perfect electromagnetic conductor (PEMC) boundaries using ferrites, magnet-less non-reciprocal metamaterials (MNMs) and graphene,” in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Hiroshima, Japan, May 2013, pp. 652–655, *invited*.
- [326] P. Lemaitre-Auger, R. Siragusa, C. Caloz, and D. Kaddour, “Circular antenna arrays for near-field focused or multi-focused beams,” in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Hiroshima, Japan, May 2013, pp. 425–428, *invited*.
- [327] C. Caloz, “A personal perspective on CRLH antennas,” in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Hiroshima, Japan, May 2013, pp. 882–884, *invited*.
- [328] T. Kodera, D. L. Sounas, and C. Caloz, “Magnet-less non-reciprocal metamaterials with magnetic or electric gyrotropy,” in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Hiroshima, Japan, May 2013, pp. 397–400, *invited*.
- [329] N. Chamanara, D. L. Sounas, and C. Caloz, “Non-reciprocity with graphene magnetoplasmons and application to plasmonic isolators,” in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Hiroshima, Japan, May 2013, pp. 266–268, *invited*.
- [330] Q. Zhang, B. Nikfal, and C. Caloz, “High-resolution real-time spectrum sniffer for wireless communication,” in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Hiroshima, Japan, May 2013, pp. 64–66, *invited*.
- [331] N. Chamanara, D. L. Sounas, and C. Caloz, “Optically transparent and flexible graphene planar microwave structures,” in *IEEE Int. Wireless Symp.*, Beijing, China, Apr. 2013.
- [332] N. Chamanara, D. L. Sounas, and C. Caloz, “Graphene magnetoplasmons: principles and applications,” in *European Conf. Antennas Propag. (EuCAP)*, Gothenburg, Sweden, Apr. 2013, pp. 488–489, *invited*.

- [333] B. Nikfal and C. Caloz, “Real-time sector detection based on a reconfigurable leaky-wave antenna,” in *European Conf. Antennas Propag. (EuCAP)*, Gothenburg, Sweden, Apr. 2013, pp. 1729–1731, *invited*.
- [334] T. Kodera, D. Sounas, and C. Caloz, “Switchable Faraday rotation by artificial electric gyrotropy in a slot-ring metamaterial structure,” in *European Conf. Antennas Propag. (EuCAP)*, Gothenburg, Sweden, Apr. 2013, pp. 1574–1576.
- [335] C. Caloz, T. Kodera, and D. L. Sounas, “Magnet-less non-reciprocal metamaterials,” in *META’13*, Sharjah, United Arab Emirates, Mar. 2013, *invited* (keynote talk).
- [336] D. L. Sounas, B. Gurlek, T. Kodera, and C. Caloz, “Analytical modeling of a magnetless non-reciprocal metasurface under oblique plane-wave incidence,” in *META’13*, Sharjah, United Arab Emirates, Mar. 2013, *invited*.
- [337] D. L. Sounas and C. Caloz, “Non-reciprocal Faraday rotation in graphene: just a unique phenomenon or even more?” in *IEEE Radio Wireless Week*, Austin, TX, Jan. 2013, pp. 352–354, *invited*.
- [338] Q. Zhang and C. Caloz, “Design of cross-coupled phasers for analog signal processing,” in *IEEE Radio Wireless Week*, Austin, TX, Jan. 2013, pp. 172–174, *invited*.
- [339] C. Caloz, S. Gupta, B. Nikfal, and Q. Zhang, “Analog signal processing (ASP) for high-speed microwave and millimeter-wave systems,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Kaohsiung, Taiwan, Dec. 2012, pp. 691–692, *invited*.
- [340] T. Kodera, D. L. Sounas, and C. Caloz, “Magnet-less non-reciprocal metamaterial and its applications in radiative structures,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Nagoya, Japan, Oct. 2012.
- [341] C. Caloz, “Multiphysics nanoelectromagnetics,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Cape Town, South Africa, Sept. 2012, pp. 861–864, *invited*.
- [342] D. L. Sounas and C. Caloz, “Generalized network analysis of graphene sheets in arbitrary waveguide environment,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Cape Town, South Africa, Sept. 2012, pp. 634–637, *invited*.
- [343] D. L. Sounas and C. Caloz, “Graphene for highly tunable non-reciprocal electromagnetic devices,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Chicago, IL, Jul. 2012, *invited*.
- [344] S. Abielmona, H. V. Nguyen, and C. Caloz, “CRLH LWA with polarization diversity using equalized common and differential modes,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Chicago, IL, Jul. 2012.
- [345] H. Shoorian, D. L. Sounas, and C. Caloz, “Bessel beam scattering by a conducting sphere,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Chicago, IL, Jul. 2012.

- [346] D. L. Sounas and C. Caloz, “A novel non-local polarizabilities model for accurate homogenization of metamaterials,” in *CNC/USNC URSI National Radio Science Meeting*, Chicago, IL, Jul. 2012.
- [347] D. L. Sounas, T. Kodera, and C. Caloz, “Network modeling of multi-layer magnet-less non-reciprocal gyrotropic metamaterials,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Chicago, IL, Jul. 2012.
- [348] A. Shahvarpour, S. Couture, and C. Caloz, “Bandwidth enhancement of a patch antenna using a wire-ferrite substrate,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Chicago, IL, Jul. 2012.
- [349] T. Kodera, D. L. Sounas, and C. Caloz, “Faraday rotation by artificial electric gyrotropy in a transparent slot-ring metamaterial structure,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Chicago, IL, Jul. 2012.
- [350] C. Caloz and D. L. Sounas, “Field theory of electromagnetic metamaterials and beyond,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Montreal, Canada, Jun. 2012, *invited*.
- [351] D. L. Sounas, T. Szkopek, and C. Caloz, “Non-reciprocal gyrotropy in graphene: new phenomena and applications,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Montreal, Canada, Jun. 2012, *invited*.
- [352] S. Gupta and C. Caloz, “Highly dispersive delay structure exploiting the tight coupling property of the CRLH-CRLH coupler for enhanced resolution analog signal processing,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Montreal, Canada, Jun. 2012.
- [353] T. Kodera, D. L. Sounas, and C. Caloz, “Isolator utilizing artificial magnetic gyrotropy,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Montreal, Canada, Jun. 2012.
- [354] S. Otto, K. Solbach, and C. Caloz, “Complex frequency versus complex propagation constant modeling and Q-balancing in periodic structures,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Montreal, Canada, Jun. 2012.
- [355] B. Nikfal and C. Caloz, “Hybrid time-frequency RFID system,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Montreal, Canada, Jun. 2012.
- [356] H. S. Skulason, H. V. Nguyen, A. Guermoune, M. Siaj, C. Caloz, and T. Szkopek, “Contactless impedance measurement of large-area high-quality graphene,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Montreal, Canada, Jun. 2012.
- [357] C. Caloz, “Next-generation metamaterials,” in *International workshop on microwave and millimeter wave circuits and system technology (MMWCST)*, Chengdu, China, Apr. 2012, *invited* (plenary talk).
- [358] D. Ménard, L.-P. Carignan, V. Boucher, C. Caloz, and A. Yelon, “Engineering the electromagnetic properties of ferromagnetic nanowire arrays,” in *Advanced Electromagnetics Symposium (AES)*, Paris, France, Apr. 2012, *invited*.

- [359] C. Caloz, D. L. Sounas, and T. Kodera, “Magnet-less non-reciprocal metamaterials: an industrial breakthrough?” in *Fifth International Workshop on Electromagnetic Metamaterials (IWEM-V)*, Albuquerque, NM, Mar. 2012, *invited*.
- [360] S. Otto, K. Solbach, and C. Caloz, “Recent advances in the modeling of periodic leaky-wave antennas scanning through broadside,” in *European Conf. Antennas Propag. (EuCAP)*, Prague, Czech Republic, Mar. 2012, *invited*.
- [361] S. Otto, A. Al-Bassam, A. Rennings, K. Sobach, and C. Caloz, “Q-balancing in periodic leaky-wave antennas to mitigate broadside radiation issues,” in *German Microwave Conf. (GEMIC)*, Ilmenau, Germany, Mar. 2012.
- [362] D. L. Sounas and C. Caloz, “Graphene-based gyrotropic microwave and THz components,” in *IEEE Radio Wireless Week Workshop on Advances of Nanoelectronics in RF Technology*, Santa Clara, CA, Jan. 2012, *invited*.
- [363] C. Caloz, “Electromagnetic metamaterials and their microwave applications,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Jeju, South Korea, Oct. 2011, *invited* (short course).
- [364] C. Caloz, “Next-generation metamaterials for unprecedented microwave systems,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Jeju, South Korea, Oct. 2011, *invited* (plenary talk).
- [365] C. Caloz, “Electromagnetic metamaterials and their microwave applications,” in *IEEE Int. Symp. Antennas Propag. (ISAP) Short Course*, Jeju, South Korea, Oct. 2011, *invited*.
- [366] C. Caloz, “Recent advances in metamaterial leaky-wave antennas,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Jeju, South Korea, Oct. 2011, *invited*.
- [367] T. Kodera, D. L. Sounas, and C. Caloz, “PEMC metamaterial surface whose gyrotropy is provided by traveling-wave ring resonators,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Jeju, South Korea, Oct. 2011, *invited*.
- [368] S. Gupta and C. Caloz, “Dispersion-compensation technique for log-periodic antennas using C-section all-pass dispersive delay structures,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Jeju, South Korea, Oct. 2011.
- [369] S. Couture, D. L. Sounas, and C. Caloz, “Surface and leaky-wave modes in a grounded dielectric slab covered with graphene,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Jeju, South Korea, Oct. 2011.
- [370] L.-P. Carignan, H. Razavipour, D. Ménard, A. Yelon, and C. Caloz, “Ferromagnetic nanowire metamaterials : theory and application,” in *European Conf. Antennas Propag. (EuCAP) Workshop on Novel Devices and Advanced Modeling Techniques in RF Nanoelectronics*, Manchester, UK, Oct. 2011, p. 73, *invited*.

- [371] D. L. Sounas, T. Kodera, and C. Caloz, “Non-reciprocal gyrotropic semiconductor-based metasurface not requiring magnetic bias,” in *Metamaterials’2011, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Barcelona, Spain, Oct. 2011, pp. 636–638, *invited*.
- [372] D. L. Sounas and C. Caloz, “Gyrotropic properties of graphene and subsequent microwave applications,” in *IEEE European Microw. Conf. (EuMC)*, Manchester, England, Oct. 2011, pp. 1142–1145, *invited*.
- [373] B. Nikfal and C. Caloz, “Low-complexity and frequency-scalable analog real-time FDM receiver based on a dispersive delay structure,” in *IEEE European Microw. Conf. (EuMC)*, Manchester, England, Oct. 2011, pp. 397–400.
- [374] C. Caloz, “Next-generation metamaterials for unprecedented microwave systems,” in *Int. Conference on Telecommunications in Modern Satellite, Cable and Broadcasting Services (TELSIKS)*, Niš, Serbia, Oct. 2011, pp. 3–12, *invited* (plenary talk).
- [375] D. L. Sounas and C. Caloz, “Field displacement in a graphene loaded waveguide,” in *Int. Conference on Telecommunications in Modern Satellite, Cable and Broadcasting Services (TELSIKS)*, Niš, Serbia, Oct. 2011, pp. 25–26, *invited*.
- [376] N. Yang, H. V. Nguyen, and C. Caloz, “Mixed-mode characterization of a circularly-polarized CRLH leaky-wave antenna,” in *Int. Conference on Telecommunications in Modern Satellite, Cable and Broadcasting Services (TELSIKS)*, Niš, Serbia, Oct. 2011, pp. 27–30.
- [377] L.-P. Carignan, D. Ménard, and C. Caloz, “Ferromagnetic nanowire material electromagnetic and quantum devices,” in *Int. Conference on Telecommunications in Modern Satellite, Cable and Broadcasting Services (TELSIKS)*, Niš, Serbia, Oct. 2011, pp. 47–50.
- [378] S. Gupta, B. Nikfal, and C. Caloz, “Amplitude equalized transmission line dispersive delay structure for analog signal processing,” in *Int. Conference on Telecommunications in Modern Satellite, Cable and Broadcasting Services (TELSIKS)*, Niš, Serbia, Oct. 2011, pp. 379–382.
- [379] T. Kodera, D. L. Sounas, and C. Caloz, “Artificial magnetic gyrotropy and its application to RF devices,” in *IEICE Society Conf.*, Sapporo, Japan, Sept. 2011, pp. 22–23.
- [380] T. Kaneko, Y. Horii, S. Gupta, B. Nikfal, and C. Caloz, “Design of multilayer broadside-coupled dispersive delay structures (DDS) for real-time analog signal processing,” in *IEICE Society Conf.*, Sapporo, Japan, Sept. 2011, p. 86.
- [381] D. L. Sounas and C. Caloz, “Next generation metamaterials: From the micro to the atomic scales,” in *Regroupement Québécois sur les Matériaux de Pointe Summer School*, Mont Orford, Canada, Aug. 2011, *invited*.

- [382] L.-P. Carignan, V. Boucher, C. Caloz, A. Yelon, and D. Ménard, “Microwave response of ferromagnetic nanowire arrays,” in *Moscow Int. Symp. on Magnetism*, Moscow, Russia, Aug. 2011, *invited*.
- [383] M. Dagher, D. L. Sounas, R. Martel, and C. Caloz, “AC conductivity of metallic carbon nanotubes (CNTs) exposed to a DC field,” in *URSI General Assembly and Scientific Symposium(GASS)*, Istanbul, Turkey, Aug. 2011.
- [384] A. Shahvarpour, A. A. Melcon, and C. Caloz, “Radiation efficiency enhancement of a horizontal dipole on an electrically thick substrate by a PMC ground plane,” in *URSI General Assembly and Scientific Symposium(GASS)*, Istanbul, Turkey, Aug. 2011.
- [385] T. Kodera, D. L. Sounas, H. V. Nguyen, H. Razavipour, and C. Caloz, “Field displacement in a traveling-wave ring resonator meta-structure,” in *URSI General Assembly and Scientific Symposium(GASS)*, Istanbul, Turkey, Aug. 2011, *invited*.
- [386] D. L. Sounas and C. Caloz, “New type of gyrotropy in graphene - Comparison with gyrotropy in plasmas,” in *URSI General Assembly and Scientific Symposium(GASS)*, Istanbul, Turkey, Aug. 2011.
- [387] N. Yang, C. Caloz, and K. Wu, “Measurement of balanced antennas using mixed-mode network parameters,” in *URSI General Assembly and Scientific Symposium(GASS)*, Istanbul, Turkey, Aug. 2011.
- [388] P. Lemaître-Auger, S. Abielmona, and C. Caloz, “Circular antenna array for microwave bessel beam generation,” in *URSI General Assembly and Scientific Symposium(GASS)*, Istanbul, Turkey, Aug. 2011.
- [389] C. Caloz, “The new paradigm of multiscale metamaterials,” in *Int. Workshop on Fibre Optics and Passive Components. (WFOPC)*, Montréal, Canada, Jul. 2011, *invited* (keynote talk).
- [390] D. L. Sounas and C. Caloz, “Graphene-based non-reciprocal spatial isolator,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Spokane, WA, Jul. 2011, pp. 1597–1600.
- [391] S. Gupta, C. Caloz, M. Samardzija, S. Yuanfeng, J. Hirokawa, and M. Ando, “Corrugations for suppressing undesired wave propagation in the transverse direction in a 45° linearly polarized 76 GHz parallel-plate waveguide two-dimensional slot-array,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Spokane, WA, Jul. 2011, pp. 3025–3028.
- [392] A. Shahvarpour, A. A. Melcon, and C. Caloz, “Analysis of the radiation efficiency of a horizontal electric dipole on a grounded dielectric slab,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Spokane, WA, Jul. 2011, pp. 1293–1296.
- [393] D. L. Sounas, T. Kodera, and C. Caloz, “Non-reciprocal gyrotropic electrically-biased ring metasurface,” in *CNC/USNC URSI National Radio Science Meeting*, Spokane, WA, Jul. 2011, *invited*.



- [394] H. V. Nguyen, S. Abielmona, N. Yang, and C. Caloz, “Planar and compact circularly-polarized CRLH LWA using longitudinal and transversal radiation currents,” in *CNC/USNC URSI National Radio Science Meeting*, Spokane, WA, Jul. 2011.
- [395] N. Yang, C. Caloz, D. Jackson, and K. Wu, “Generalized phase-shifted unit-cell periodic leaky-wave antennas for single-beam full-space scanning,” in *CNC/USNC URSI National Radio Science Meeting*, Spokane, WA, Jul. 2011.
- [396] S. Otto, A. Rennings, K. Solbach, and C. Caloz, “Broadside radiation in frequency-scanning periodic leaky-wave antennas: circuit analysis, asymptotic formulas, and fundamental behaviors,” in *CNC/USNC URSI National Radio Science Meeting*, Spokane, WA, Jul. 2011.
- [397] D. L. Sounas and C. Caloz, “Gyrotropy and non-reciprocity of graphene for microwave applications,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Baltimore, MD, Jun. 2011, *invited*.
- [398] D. R. Jackson, C. Caloz, and T. Itoh, “The legacy of professor Nathan Marcuvitz and the field of leaky waves,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Baltimore, MD, Jun. 2011.
- [399] H. S. Skulason, H. V. Nguyen, A. Guermoune, M. Siaj, C. Caloz, and T. Szkopek, “Integration of graphene into low-loss, high frequency coplanar waveguide circuits,” in *Graphene: the Road to Applications*, Boston, MA, May 2011.
- [400] C. Caloz, “Electromagnetic metamaterials and their microwave applications,” in *IEEE Wireless and Microwave Technolgy Conference (WAMICON)*, Clearwater, FL, Apr. 2011, *invited* (short course).
- [401] D. L. Sounas and C. Caloz, “Graphene-based non-reciprocal metasurface,” in *European Conf. Antennas Propag. (EuCAP)*, Rome, Italy, Apr. 2011, pp. 2566–2569, *invited*.
- [402] H. V. Nguyen, S. Abielmona, and C. Caloz, “End-switched CRLH leaky-wave antenna with enhanced electronic full-space beam steering performance,” in *European Conf. Antennas Propag. (EuCAP)*, Rome, Italy, Apr. 2011, pp. 3657–3659.
- [403] C. Caloz, “Electromagnetic metamaterials: A new paradigm in modern science and technology,” in *IEICE Workshop on Recent Progress in Microwave/Millimeter-wave Technologies and Applications*, Yokohama, Japan, Dec. 2010, *invited*.
- [404] C. Caloz, “Electromagnetic metamaterials and their microwave applications,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2010, *invited* (short course).
- [405] H. Razavipour, L.-P. Carignan, D. Ménard, A. Yelon, and C. Caloz, “Ferromagnetic nanowire (FMNW) self-biased h-plane resonance isolator,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2010, pp. 1517–1520.

- [406] A. Shahvarpour, A. A. Melcon, and C. Caloz, “Anisotropic meta-substrate conical-beam leaky-wave antenna,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2010, pp. 299–302.
- [407] T. Kodera and C. Caloz, “Leakage control in the CRLH uniform ferrite-loaded open waveguide leaky-wave antenna using a transversally extending evanescent waveguide structure,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2010, pp. 869–872.
- [408] S. Gupta, B. Nikfal, and C. Caloz, “RFID system based on pulse-position modulation using group delay engineered microwave C-sections,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2010, pp. 203–206.
- [409] L.-P. Carignan, D. Ménard, A. Yelon, and C. Caloz, “Recent advances in ferromagnetic nanowire composites for microwave applications,” in *European Conf. Antennas Propag. (EuCAP) Workshop on Nanotechnologies : The Gateway to Innovative Radio Frequency Devices*, Paris, France, Oct. 2010, p. 80, *invited*.
- [410] A. Shahvarpour, A. A. Melcon, and C. Caloz, “Analysis of the radiation properties of a point source on a uniaxially anisotropic meta-substrate and application to a high-efficiency antenna,” in *IEEE European Microw. Conf. (EuMC)*, Paris, France, Sept. 2010, pp. 1425–1428.
- [411] T. Kodera and C. Caloz, “Integrated leaky-wave antenna front-end using a ferrite-loaded open waveguide structure,” in *IEEE European Microw. Conf. (EuMC)*, Paris, France, Sept. 2010, pp. 468–472.
- [412] S. Gupta and C. Caloz, “Analog inverse Fourier transformer using group delay engineered C-section all-pass network,” in *IEEE European Microw. Conf. (EuMC)*, Paris, France, Sept. 2010, pp. 389–392.
- [413] A. Rennings, P. Schneider, S. Otto, D. Erni, C. Caloz, and M. E. Ladd, “A CRLH zeroth-order resonant antenna (ZORA) with high near-field polarization purity used as an RF coil element for ultra high field MRI,” in *Metamaterials’2010, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Karlsruhe, Germany, Sept. 2010, pp. 92–94, *invited*.
- [414] C. Caloz, “Metamaterial dispersion engineering: a new paradigm in microwave science and technology,” in *Metamaterials’2010, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Karlsruhe, Germany, Sept. 2010, pp. 1–2, *invited* (plenary talk).
- [415] D. Ménard, V. Boucher, L.-P. Carignan, S. Hadj-Messaoud, C. Lacroix, C. Caloz, and A. Yelon, “Microwave response of ferromagnetic nanowire arrays,” in *Int. Workshop on Magnetic Wires (IWMW)*, Bodrum, Turkey, Jul. 2010, p. 6, *invited*.
- [416] S. Couture, J. Gauthier, A. Parsa, T. Kodera, and C. Caloz, “Tunable NRI wedge made of metallic wires in a ferrite host: lens structure, experimental demonstration, and scanning antenna / spectral analyzer applications,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Toronto, Canada, Jul. 2010, *invited*.

- [417] A. Shahvarpour, A. A. Melcon, and C. Caloz, “Bandwidth enhancement and beam squint reduction of leaky modes in a uniaxially anisotropic meta-substrate,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Toronto, Canada, Jul. 2010, *invited*.
- [418] S. Gupta and C. Caloz, “Analog real-time Fourier transformer using a group delay engineered C-section all-pass network,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Toronto, Canada, Jul. 2010, *invited*.
- [419] C. Caloz, T. Kodera, L.-P. Carignan, H. Razavipour, D. Ménard, and A. Yelon, “Ferromagnetic nanowire materials and their application to leaky-wave antennas with the benefits of self-biasing, integration and double ferromagnetic resonance,” in *CNC/USNC URSI National Radio Science Meeting*, Toronto, Canada, Jul. 2010, *invited*.
- [420] N. Yang, C. Caloz, and K. Wu, “Full-space scanning phase reversal traveling wave antenna,” in *CNC/USNC URSI National Radio Science Meeting*, Toronto, Canada, Jul. 2010, *invited*.
- [421] S. Couture, A. Parsa, and C. Caloz, “Design of a size-independent zero-permittivity rectangular resonator and possible antenna applications,” in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Ottawa, Canada, Jul. 2010, *invited*.
- [422] A. Shahvarpour, A. Alvarez-Melcon, and C. Caloz, “Spectral transmission line analysis of a composite right/left-handed uniaxially anisotropic meta-substrate,” in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Ottawa, Canada, Jul. 2010.
- [423] N. Yang, C. Caloz, and K. Wu, “High-efficiency balanced phase-reversal antennas: principle, bandwidth enhancement, frequency tuning, and beam scanning,” in *American Electromagnetics Conf. (AMEREM)*, Ottawa, Canada, Jul. 2010, *invited*.
- [424] T. Kodera and C. Caloz, “Novel magnetic radiative structures inspired by metamaterial concepts,” in *American Electromagnetics Conf. (AMEREM)*, Ottawa, Canada, Jul. 2010.
- [425] J. S. Gómez-Díaz, A. Alvarez-Melcon, and C. Caloz, “Impulse-regime analysis of metamaterial-based leaky-wave antennas and applications,” in *American Electromagnetics Conf. (AMEREM)*, Ottawa, Canada, Jul. 2010, *invited*.
- [426] D. Ménard, V. Boucher, L.-P. Carignan, S. Hadj-Messaoud, C. Lacroix, C. Caloz, and A. Yelon, “Engineering the microwave response of ferromagnetic nanowire arrays,” in *Int. Conf. Microwave Magnetism (ICMM)*, Boston, MA, Jun. 2010, p. 94, *invited*.
- [427] L.-P. Carignan, V. Boucher, C. Lacroix, C. Caloz, A. Yelon, and D. Ménard, “Double ferromagnetic resonance in CoFeB ferromagnetic nanowire arrays and application to selfbiased microwave devices,” in *Int. Conf. Microwave Magnetism (ICMM)*, Boston, MA, Jun. 2010, p. 41.

- [428] C. Caloz, “Recent advances in metamaterial smart antenna concepts and applications,” in *IEEE MTT-S Int. Microw. Symp. (IMS) Workshop on Practical Metamaterial RF and Antennas for Commercial Application*, Anaheim, CA, May 2010, *invited*.
- [429] L.-P. Carignan, T. Kodera, D. Ménard, A. Yelon, and C. Caloz, “Ferromagnetic nanowire metamaterial structures for microwave applications,” in *IEEE MTT-S Int. Microw. Symp. (IMS) Workshop on New Microwave Devices and Materials Based on Nanotechnology*, Anaheim, CA, May 2010, *invited*.
- [430] C. Caloz, L.-P. Carignan, V. Boucher, T. Kodera, S. Couture, A. Parsa, D. Ménard, and A. Yelon, “Recent advances in micro-structured electric and nano-structured magnetic microwave metamaterials,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Anaheim, CA, May 2010, pp. 1416–1419, *invited*.
- [431] L.-P. Carignan, C. Caloz, and D. Ménard, “Dual-band integrated self-biased edge-mode isolator based on the double ferromagnetic resonance of a bistable nanowire substrate,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Anaheim, CA, May 2010, pp. 1336–1339.
- [432] S. Otto, A. Rennings, T. Liebig, C. Caloz, and K. Solbach, “An energy-based circuit parameter extraction method for CRLH leaky-wave antennas,” in *European Conf. Antennas Propag. (EuCAP)*, Barcelona, Spain, Apr. 2010.
- [433] R. Siragusa, E. Perret, H. V. Hoang, P. Lemaître-Auger, S. Tedjini, and C. Caloz, “Automated design and sensitivity of CRLH balanced structures using co-design approach,” in *Metamaterials’2010, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Cairo, Egypt, Feb. 2010.
- [434] C. Caloz, “Some novel directions in metamaterial engineering,” in *Institute for Pure and Applied Mathematics Workshop on Metamaterials: Applications, Analysis and Modeling*, Los Angeles, CA, Jan. 2010.
- [435] H. V. Nguyen, S. Abielmona, A. Parsa, and C. Caloz, “Novel power recycling schemes for enhanced radiation efficiency in leaky-wave antennas,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Singapore, Dec. 2009.
- [436] S. Gupta, J. S. Gómez-Díaz, and C. Caloz, “Frequency resolved electrical gating (FREG) system based on a CRLH leaky-wave antenna for UWB signal characterization,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Singapore, Dec. 2009.
- [437] R. Siragusa, H. V. Nguyen, E. Perret, P. Lemaître-Auger, S. Tedjini, and C. Caloz, “Automated design of CRLH structures using co-design synthesis computational approach,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Singapore, Dec. 2009.
- [438] C. Caloz, “Metamaterial analog signal processing,” in *IEEE European Microw. Conf. (EuMC) Workshop on Recent Advances in Microwave Applications of Metamaterial Concepts*, Rome, Italy, Sept. 2009, *invited*.

- [439] L.-P. Carignan, T. Kodera, A. Yelon, C. Caloz, and D. Ménard, “Integrated and self-biased planar magnetic microwave circuits based on ferromagnetic nanowire substrates,” in *IEEE European Microw. Conf. (EuMC)*, Rome, Italy, Sept. 2009, pp. 743–746.
- [440] A. Shahvarpour, T. Kodera, A. Parsa, and C. Caloz, “Realization of an effective free-space perfect electromagnetic conductor (PEMC) boundary by a grounded ferrite slab using Faraday rotation,” in *IEEE European Microw. Conf. (EuMC)*, Rome, Italy, Sept. 2009, pp. 731–734.
- [441] S. Gupta, J. S. Gómez-Díaz, and C. Caloz, “Frequency resolved electrical gating (FREG) system based on a CRLH leaky-wave antenna for UWB signal characterization,” in *IEEE European Microw. Conf. (EuMC)*, Rome, Italy, Sept. 2009, pp. 622–625.
- [442] J. S. Gómez-Díaz, S. Gupta, A. Alvarez-Melcon, and C. Caloz, “Numerical analysis of impulse regime phenomena in linear and non-linear metamaterial transmission lines,” in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2009, *invited*.
- [443] J. S. Gómez-Díaz, S. Gupta, J. L. Gomez-Tornero, M. Garcia-Vigueras, C. Caloz, and A. Alvarez-Melcon, “Efecto Talbot espacio-temporal basado en CRLH LWAs: fundamentos y validacion experimental,” in *Simposium Nacional de la Union Cientifica de Radio URSI*, Santander, Spain, Sept. 2009.
- [444] J. S. Gómez-Díaz, S. Gupta, J. Pascual-Garcia, D. Canete-Rebenaque, F. D. Quesada-Pereira, C. Caloz, and A. Alvarez-Melcon, “Resonador CRLH de banda ancha: aplicacion para la multiplicacion sintonizable de la periodicidad de un tren de pulsos,” in *Simposium Nacional de la Union Cientifica de Radio URSI*, Santander, Spain, Sept. 2009.
- [445] A. Rennings, P. Schneider, C. Caloz, and S. Orzada, “Preliminary experiments on a CRLH metamaterial zeroth-order resonant coil (ZORC) element for 7 tesla MRI applications with large field of view,” in *Metamaterials’2009, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, London, England, Aug. 2009, pp. 126–128, *invited*.
- [446] A. Rennings, T. Liebig, S. Otto, C. Caloz, and D. Erni, “Directive antennas based on zeroth-order resonant CRLH metamaterials implemented in multilayer-technology,” in *Metamaterials’2009, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, London, England, Aug. 2009, pp. 376–378.
- [447] C. Caloz, “Electromagnetic metamaterial structures: Some more concepts and applications,” in *IEEE MTT-S Int. Microw. Symp. (IMS) Rump Session on Metamaterials*, Boston, MA, Jun. 2009.
- [448] C. Caloz, “Reconfigurability at microwaves using recent metaamterial concepts and techniques,” in *IEEE MTT-S Int. Microw. Symp. (IMS) Workshop on Tunable RF-Components and Modules for Wireless Communication Systems*, Boston, MA, Jun. 2009, *invited*.

- [449] A. Shahvarpour and C. Caloz, “Ferrite effective perfect magnetic conductor (fe-pmc) and application to waveguide miniaturization,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Boston, MA, Jun. 2009, pp. 25–28.
- [450] T. Kodera and C. Caloz, “Leaky-wave antenna integrated duplexer using CRLH uniform ferrite-loaded open waveguide,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Boston, MA, Jun. 2009, pp. 21–24.
- [451] M. Aljerjawi, C. Nerguizian, R. G. Bosisio, Y. Xu, C. Caloz, and K. Wu, “Wave-radio interferometer transceiver for UWB,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Boston, MA, Jun. 2009, pp. 13–16.
- [452] S. M. Mikki, C. Caloz, and A. A. Kishk, “On the nature of electromagnetic interactions at the nanoscale,” in *CNC/USNC URSI National Radio Science Meeting*, Charleston, SC, Jun. 2009, *invited*.
- [453] S. Abielmona, H. V. Nguyen, and C. Caloz, “Direction of arrival estimation using an electronically-scanned CRLH leaky-wave antenna,” in *CNC/USNC URSI National Radio Science Meeting*, Charleston, SC, Jun. 2009.
- [454] A. Parsa, R. Paknys, and C. Caloz, “Design and implementation of a rectangular dielectric resonator using artificial plasma for quality factor enhancement,” in *CNC/USNC URSI National Radio Science Meeting*, Charleston, SC, Jun. 2009.
- [455] A. Parsa and C. Caloz, “Reflection characteristics of two parallel reinforced concrete slabs,” in *CNC/USNC URSI National Radio Science Meeting*, Charleston, SC, Jun. 2009.
- [456] T. Kodera, A. Parsa, and C. Caloz, “Non-reciprocal ferrite antenna radome: the faradome,” in *CNC/USNC URSI National Radio Science Meeting*, Charleston, SC, Jun. 2009.
- [457] C. Caloz, “Recent advances in microwave applications of metamaterials,” in *Los Alamos National Laboratory International Workshop on Electromagnetic Metamaterials III: Toward Real World Applications*, Los Alamos, New Mexico, May 2009, *invited*.
- [458] R. Siragusa, H. V. Nguyen, E. Perret, P. Lemaître-Auger, S. Tedjini, and C. Caloz, “Méthode de conception automatisée appliquée aux lignes composites main gauche/droite,” in *Journées Nationales Microondes*, Grenoble, France, May 2009, p. 114.
- [459] L.-P. Carignan, M. Massicotte, C. Caloz, A. Yelon, and D. Ménard, “Magnetization process in ferromagnetic nanowire arrays,” in *IEEE Inter-mag.*, Sacramento, CA, May 2009, p. 105.
- [460] T. Kodera and C. Caloz, “Non-reciprocal magnetic frequency selective surface,” in *European Conf. Antennas Propag. (EuCAP)*, Berlin, Germany, Mar. 2009, pp. 1552–1559.
- [461] C. Caloz and A. Rennings, “Overview of metamaterial resonant antennas,” in *European Conf. Antennas Propag. (EuCAP)*, Berlin, Germany, Mar. 2009, pp. 615–619, *invited*.

- [462] J. S. Gómez-Díaz, C. Caloz, and A. Alvarez-Melcon, “Spatio-temporal Talbot effects in impulse-regime metamaterial leaky-wave antennas,” in *European Conf. Antennas Propag. (EuCAP)*, Berlin, Germany, Mar. 2009, pp. 870–874, *invited*.
- [463] A. Parsa and C. Caloz, “Reflection and transmission by two parallel reinforced concrete slabs,” in *European Conf. Antennas Propag. (EuCAP)*, Berlin, Germany, Mar. 2009, pp. 2296–2299.
- [464] T. Liebig, A. Rennings, S. Otto, C. Caloz, and D. Erni, “Comparison between CRLH zeroth-order antenna (ZORA) and series-fed patch array,” in *European Conf. Antennas Propag. (EuCAP)*, Berlin, Germany, Mar. 2009, pp. 529–532, *invited*.
- [465] A. Rennings, J. Mosig, A. Bahr, C. Caloz, M. E. Ladd, and D. Erni, “A CRLH metamaterial based RF coil element for magnetic resonance imaging at 7 tesla,” in *European Conf. Antennas Propag. (EuCAP)*, Berlin, Germany, Mar. 2009, pp. 3231–3234, *invited*.
- [466] C. Caloz, “EBGs and metamaterials: concepts, structures and applications,” in *European Conf. Antennas Propag. (EuCAP)*, Berlin, Germany, Mar. 2009, p. 2939, *invited* (plenary talk).
- [467] J. S. Gómez-Díaz, A. Alvarez-Melcon, and C. Caloz, “Time-domain Green’s function technique for highly-dispersive metamaterial waveguide and antenna structures,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Hong-Kong, China, Dec. 2008, *invited*.
- [468] T. Kodera and C. Caloz, “Comparison of various ferrite-loaded CRLH leaky-wave antenna structures,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Hong-Kong, China, Dec. 2008, *invited*.
- [469] A. Parsa and C. Caloz, “Rectangular dielectric resonator quality factor enhancement using external corner posts,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Hong-Kong, China, Dec. 2008.
- [470] N. Yang, C. Caloz, and K. Wu, “Center-fed high-gain planar phase-reversal antenna array with enhanced radiation bandwidth for millimeter waves,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Hong-Kong, China, Dec. 2008.
- [471] M. Aljerjawi, Y. Xu, C. Nerguizian, C. Caloz, K. Wu, and R. G. Bosio, “UWB wave radio,” in *Software Defined Radio (SDR) Forum Technical Conf.*, Washington, DC, Oct. 2008.
- [472] J. S. Gómez-Díaz, S. Gupta, M. Martínez-Mendoza, A. Alvarez-Melcon, and C. Caloz, “Estudio de la radiación de antenas CRLH leaky-wave excitadas por pulsos temporales,” in *Simposium Nacional de la Union Científica de Radio URSI*, Madrid, Spain, Sept. 2008.
- [473] C. Caloz, “Microwave metamaterial components and systems,” in *Assembly of Union Radio Science International (URSI) Short Course on Metamaterials and Applications*, Chicago, IL, Aug. 2008, *invited*.

- [474] C. Caloz, “Recent advances in metamaterial antennas,” in *Assembly of Union Radio Science International (URSI)*, Chicago, IL, Aug. 2008, *invited*.
- [475] S. Gupta and C. Caloz, “Spatial demultiplexer based on the spectral decomposition property of the metamaterial leaky-wave antenna,” in *Assembly of Union Radio Science International (URSI)*, Chicago, IL, Aug. 2008.
- [476] A. Shahvarpour, S. Gupta, and C. Caloz, “Study of left-handed Schrödinger solitons in an Ag film plasmonic waveguide using a nonlinear transmission line approach,” in *Assembly of Union Radio Science International (URSI)*, Chicago, IL, Aug. 2008.
- [477] N. Yang, C. Caloz, and K. Wu, “Slow-wave rail coplanar strip (R-CPS) line with low impedance capability,” in *Assembly of Union Radio Science International (URSI)*, Chicago, IL, Aug. 2008.
- [478] S. Abielmona, S. Gupta, H. V. Nguyen, and C. Caloz, “Dispersion-engineered metamaterial devices for impulse-regime,” in *Assembly of Union Radio Science International (URSI)*, Chicago, IL, Aug. 2008.
- [479] H. V. Nguyen, S. Abielmona, and C. Caloz, “Analog dispersive time delay for beam-scanning phased array without beam-squinting,” in *Assembly of Union Radio Science International (URSI)*, Chicago, IL, Jul. 2008.
- [480] J. S. Gómez-Díaz, A. Alvarez-Melcon, and C. Caloz, “Characterization of pulse radiation by CRLH leaky-wave antennas using a time-domain Green’s function approach,” in *IEEE AP-S Int. Antennas Propag. (APS)*, San Diego, CA, Jul. 2008.
- [481] R. Siragusa, H. V. Nguyen, C. Caloz, and S. Tedjini, “Efficient electronically scanned CRLH leaky-wave antenna using independent double tuning for impedance equalization,” in *CNC/USNC URSI National Radio Science Meeting*, San Diego, CA, Jul. 2008.
- [482] C. Caloz, L.-P. Carignan, D. Ménard, and A. Yelon, “The concept of multi-scale metamaterials,” in *CNC/USNC URSI National Radio Science Meeting*, San Diego, CA, Jul. 2008.
- [483] L.-P. Carignan, C. Lacroix, F. Béron, V. Boucher, C. Caloz, A. Yelon, and D. Ménard, “Dipolar interactions in ferromagnetic nanowire arrays,” in *Canadian Association of Physicists (CAP) Congress*, Québec, QC, Jun. 2008, p. 59.
- [484] S. Gupta, S. Abielmona, and C. Caloz, “Leaky-wave based spectrum analyzer with unrestricted time-frequency resolution,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Atlanta, GA, Jun. 2008, pp. 807–810.
- [485] N. Yang, C. Caloz, and K. Wu, “Self-imaging overmoded balanced waveguide power combiner/divider,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Atlanta, GA, Jun. 2008, pp. 883–886.



- [486] M. Zedler, P. So, C. Caloz, and P. Russer, “Modeling of 3D RTLM based metamaterial structures with negative refractive index: an IIR-filter implementation for SCN TLM full-wave simulators,” in *Int. Review of Progress in Applied Computational Electromagnetics (ACES)*, Niagara Falls, ON, Mar. 2008, pp. 721–726, *invited*.
- [487] C. Caloz and S. Gupta, “Phase-engineered metamaterial structures and devices,” in *Progress in Electromagnetics Research Symp. (PIERS)*, Hangzhou, China, Mar. 2008, p. 238, *invited*.
- [488] J.-F. Frigon, C. Caloz, and Y. Y. Zhao, “Dynamic radiation pattern diversity (DRPD) MIMO using CRLH leaky-wave antennas,” in *IEEE Radio Wireless Symp.*, Orlando, FL, Jan. 2008, pp. 635–638.
- [489] H. V. Nguyen, N. Yang, and C. Caloz, “CPS backfire-to-endfire leaky-wave antenna,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Bangkok, Thailand, Dec. 2007.
- [490] A. Rennings, T. Liebig, C. Caloz, and P. Waldow, “CRLH series mode zeroth order resonant antenna (ZORA) implemented in LTCC technology,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Bangkok, Thailand, Dec. 2007.
- [491] C. Caloz, “Metamaterial-based microwave components and systems,” in *Korea Electromagnetic Engineering Society (KEES) Workshop on Metamaterials*, Seoul, Korea, Oct. 2007, *invited* (plenary talk).
- [492] A. Rennings, T. Liebig, S. Abielmona, C. Caloz, and P. Waldow, “Tri-band and dual-polarized antenna based on (unbalanced) CRLH transmission line,” in *IEEE European Microw. Conf. (EuMC)*, Munich, Germany, Oct. 2007, pp. 720–723.
- [493] M. Zedler, C. Caloz, and P. Russer, “Analysis of a planarized 3D isotropic LH metamaterial based on the rotated TLM scheme,” in *IEEE European Microw. Conf. (EuMC)*, Munich, Germany, Oct. 2007, pp. 624–627.
- [494] C. Caloz, “A new generation of metamaterial-based electromagnetic devices,” in *Los Alamos National Laboratory International Workshop on Electromagnetic Metamaterials II: Gradient Lenses to Invisib Cloaks*, Los Alamos, New Mexico, May 2009, *invited*.
- [495] M. Zedler, C. Caloz, and P. Russer, “Numerical analysis of a planarized 3D isotropic LH metamaterial based on the rotated TLM scheme,” in *IEEE Int. Conf. on Computer as a Tool (EUROCON)*, Warsaw, Poland, Sept. 2007, pp. 24–27.
- [496] N. Yang, C. Caloz, and K. Wu, “Frequency-scanned slot antenna array fed by boxed stripline CRLH series network,” in *IEEE Int. Symp. Antennas Propag. (ISAP)*, Niigata, Japan, Aug. 2007, pp. 1458–1461, *invited*.
- [497] A. Rennings, J. Mosig, S. Gupta, C. Caloz, R. Kashyap, D. Erni, and P. Waldow, “Super-compact power splitter based on coupled surface plasmons,” in *Int. Symp. on Signals, Systems and Electronics (ISSSE)*, Montréal, QC, Jul. 2007, pp. 471–474.

- [498] H. V. Nguyen, S. Abielmona, A. Rennings, and C. Caloz, "Pencil-beam, 2D scanning leaky-wave antenna array," in *Int. Symp. on Signals, Systems and Electronics (ISSSE)*, Montréal, QC, Jul. 2007, pp. 139–142, *invited*.
- [499] M. Zedler, C. Caloz, and P. Russer, "Composite right-left handed (CRLH) metamaterials with Lorentz-type dispersive elements," in *Int. Symp. on Signals, Systems and Electronics (ISSSE)*, Montréal, QC, Jul. 2007, pp. 217–221, *invited*.
- [500] N. Yang, C. Caloz, H. V. Nguyen, S. Abielmona, and K. Wu, "Non-radiative CRLH boxed stripline structure with high Q performances," in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Ottawa, ON, Jul. 2007, *invited*.
- [501] S. Gupta and C. Caloz, "Temporal Talbot effect in left-handed metamaterial transmission lines," in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Ottawa, ON, Jul. 2007, *invited*.
- [502] C. Caloz, "Emerging metamaterial antennas and their advantages over conventional approaches," in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Ottawa, ON, Jul. 2007, *invited*.
- [503] H. V. Nguyen and C. Caloz, "Anisotropic backward-wave meta-substrate and its application to a microstrip leaky-wave antenna," in *CNC/USNC URSI National Radio Science Meeting*, Ottawa, ON, Jul. 2007.
- [504] S. Abielmona and C. Caloz, "Compressive receiver for frequency discrimination based on dispersion-engineered metamaterial delay line," in *CNC/USNC URSI National Radio Science Meeting*, Ottawa, ON, Jul. 2007.
- [505] C. Caloz, "A few directions toward the next generations of electromagnetic metamaterials," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Honolulu, HI, Jun. 2007.
- [506] S. Gupta, S. Abielmona, and C. Caloz, "CRLH carrier-frequency tunable impulse and continuous wave delay lines," in *IEEE AP-S Int. Antennas Propag. (APS)*, Honolulu, HI, Jun. 2007, pp. 5523–5526.
- [507] N. Yang, C. Caloz, and K. Wu, "Co-designed CPS UWB filter-antenna system," in *IEEE AP-S Int. Antennas Propag. (APS)*, Honolulu, HI, Jun. 2007, pp. 1433–1436.
- [508] S. Abielmona, H. V. Nguyen, F. Casares-Miranda, C. Camacho-Peñalosa, and C. Caloz, "Real-time digital beam-forming active leaky-wave antenna," in *IEEE AP-S Int. Antennas Propag. (APS)*, Honolulu, HI, Jun. 2007, pp. 5793–5796.
- [509] A. Rennings, T. Liebig, C. Caloz, and I. Wolff, "Double Lorentz transmission line metamaterials and their applications to triband devices," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Honolulu, HI, Jun. 2007, pp. 1427–1430.

- [510] M. Zedler, P. Russer, and C. Caloz, “Three dimensional CRLH metamaterial based on a rotated transmission matrix method (RTLTM),” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Honolulu, HI, Jun. 2007, pp. 1827–1830.
- [511] S. Gupta and C. Caloz, “Dark and bright solitons in left-handed nonlinear transmission line metamaterials,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Honolulu, HI, Jun. 2007, pp. 979–982.
- [512] N. Yang, C. Caloz, and K. Wu, “Broadband and compact double stepped-impedance CPS filters with coupled-resonance enhanced selectivity,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Honolulu, HI, Jun. 2007, pp. 755–758.
- [513] A. Rennings, A. Lauer, C. Caloz, and I. Wolff, “Extended equivalent circuit FDTD: special computational cells and their stability criteria,” in *Time Domain Methods in Modern Engineering Electrodynamics Symp.*, Munich, Germany, May 2007, *invited*.
- [514] M. Zedler, C. Caloz, and P. Russer, “A 3D isotropic left-handed metamaterial based on the rotated TLM scheme,” in *Time Domain Methods in Modern Engineering Electrodynamics Symp.*, Munich, Germany, May 2007, *invited*.
- [515] W. Tong, H. V. Nguyen, Z. Hu, and C. Caloz, “Dual composite right/left-handed (D-CRLH) transmission line in GaAs MMIC technology,” in *IEEE Int. Workshop on Antenna Technology (IWAT)*, Cambridge, HK, Mar. 2007.
- [516] A. Rennings, T. Liebig, S. Otto, C. Caloz, and I. Wolff, “Dual composite right/left-handed (D-CRLH) transmission line in GaAs MMIC technology,” in *IEEE Int. Workshop on Antenna Technology (IWAT)*, Cambridge, UK, Mar. 2007, pp. 105–108.
- [517] A. Rennings, T. Liebig, S. Otto, C. Caloz, and I. Wolff, “Highly directive resonator antennas based on composite right/left-handed (CRLH) transmission lines,” in *Int. ITG Conf. on Antennas (INICA)*, Munich, Germany, Mar. 2007.
- [518] C. Caloz and S. Gupta, “Dispersion and nonlinearity engineered metamaterial devices,” in *Metamaterials’2007, Int. Congress Advanced Electromagnetic Mat. Microw. Opt.*, Rome, Italy, Mar. 2007, *invited*.
- [519] C. Caloz, H. V. Nguyen, and Y. Zhang, “Novel metamaterial coupled-line couplers: theory and implementations,” in *Progress in Electromagnetics Research Symp. (PIERS)*, Beijing, China, Mar. 2007, *invited*.
- [520] H. V. Nguyen, J. Gauthier, J. M. Fernandez, M. Sierra-Castañer, and C. Caloz, “Metallic wire substrate (MWS) for miniaturization in planar microwave applications,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2006.
- [521] A. Rennings, S. Otto, J. Mosig, C. Caloz, and I. Wolff, “Extended composite right/left-handed (E-CRLH) metamaterial and its application as

- quadband quarter-wavelength transmission line,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2006.
- [522] S. Abielmona, H. V. Nguyen, and C. Caloz, “CRLH zeroth order resonator (ZOR): experimental demonstration of insensitivity to losses and to size,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2006.
- [523] H. V. Nguyen and C. Caloz, “Coupled mode theory approximation for arbitrary conventional/metamaterial contradirectional coupled-line couplers,” in *IEEE Asia Pacific Microw. Conf. (APMC)*, Yokohama, Japan, Dec. 2006.
- [524] J. M. Fernández, H. V. Nguyen, and C. Caloz, “Metallic wire substrate (MWS) miniaturized antenna,” in *European Conf. Antennas Propag. (EuCAP)*, Nice, France, Nov. 2006.
- [525] A. Rennings, S. Otto, T. Liebig, C. Caloz, and I. Wolff, “Dual-band CRLH ring antenna with linear/circular-polarization capability,” in *European Conf. Antennas Propag. (EuCAP)*, Nice, France, Nov. 2006.
- [526] F. P. Casares-Miranda, A. Piche, C. Camacho-Peñalosa, and C. Caloz, “Antenas leaky-wave activas basadas en metamateriales composite right/left-handed,” in *Simposium Nacional de la Union Cientifica de Radio URSI*, Oviedo, Spain, Sept. 2006, pp. 1263–1267.
- [527] H. V. Nguyen and C. Caloz, “Dual-band CRLH six-port front-end in MIM technology,” in *IEEE European Microw. Conf. (EuMC)*, Manchester, UK, Sept. 2006, pp. 122–124.
- [528] A. Rennings, M. Coulombe, and C. Caloz, “Unusual wave phenomena in a guiding/radiating clustered dielectric particle (CDP) metamaterial (MTM),” in *IEEE European Microw. Conf. (EuMC)*, Manchester, UK, Sept. 2006, pp. 439–442.
- [529] C. Caloz, H. V. Nguyen, and A. Sanada, “Novel ultrawideband (UWB) metamaterial (MTM) passive components,” in *Progress in Electromagnetics Research Symp. (PIERS)*, Tokyo, Japan, Aug. 2006, p. 26, *invited*.
- [530] C. Caloz, M. Coulombe, Y. Horii, and A. Rennings, “Clustered dielectric particle metamaterials (CDP-MTMs),” in *Progress in Electromagnetics Research Symp. (PIERS)*, Tokyo, Japan, Aug. 2006, p. 106, *invited*.
- [531] J.-D. Lacasse, J.-J. Laurin, C. Caloz, M. Gavrilovic, A. Fourmault, Y. Brand, and Y. Demers, “A coplanar CRLH leaky-wave antenna on a thin membrane substrate,” in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Montréal, QC, Jul. 2006, pp. 385–388.
- [532] J.-F. Jobin-Lépine, H. V. Nguyen, and C. Caloz, “Superluminal group velocity in CRLH transmission line metamaterials,” in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Montréal, QC, Jul. 2006, pp. 377–379.

- [533] M. Coulombe, A. Rennings, and C. Caloz, "Analysis of 1D clustered dielectric particle (CDP) waveguiding structures," in *Symp. on Antenna Technology and Applied Electromagnetics (ANTEM)*, Montréal, QC, Jul. 2006, pp. 373–376.
- [534] J.-D. Lacasse, C. Caloz, J.-J. Laurin, M. M. Gavrilovic, Y. Brand, Y. Demers, and P. de Maagt, "Loss-reduction and dispersion control for minimum beam squinting in infinite-wavelength CRLH beam forming networks," in *CNC/USNC URSI National Radio Science Meeting*, Albuquerque, NM, Jul. 2006, p. 544, *invited*.
- [535] A. Rennings, C. Caloz, and I. Wolff, "A novel clustered dielectric cubes metamaterial (CDC-MTM)," in *IEEE AP-S Int. Antennas Propag. (APS)*, Albuquerque, NM, Jul. 2006, pp. 483–486.
- [536] J. C. Iriarte, I. Eterra, R. Gonzalo, A. Gosh, J.-D. Lacasse, J.-J. Laurin, C. Caloz, Y. Brand, M. M. Gavrilovic, D. Yves, and P. de Maagt, "EBG superstrate for gain enhancement of a circularly polarized patch antenna," in *IEEE AP-S Int. Antennas Propag. (APS)*, Albuquerque, NM, Jul. 2006, pp. 2993–2996.
- [537] F. P. Casares-Miranda, C. Camacho-Peñalosa, and C. Caloz, "Active composite right/left-handed leaky-wave antennas," in *IEEE AP-S Int. Antennas Propag. (APS)*, Albuquerque, NM, Jul. 2006, pp. 23–26.
- [538] C. Caloz, Y. Horii, M. Coulombe, and A. Rennings, "Realization of left-handed metamaterials with clustered dielectric particles," in *IEICE Society Conf.*, Hokkaido, Japan, Jul. 2006, pp. 47–51.
- [539] H. V. Nguyen and C. Caloz, "Simple-design and compact MIM CRLH microstrip 3-dB coupled-line coupler," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, San Francisco, CA, Jun. 2006, pp. 1733–1736.
- [540] A. Rennings, S. Otto, and C. Caloz, "Stable and efficient time-domain simulation of metamaterials with an extended equivalent circuit (EEC) graded mesh FDTD," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, San Francisco, CA, Jun. 2006, pp. 1069–1072.
- [541] C. Caloz, F. P. Casares-Miranda, and C. Camacho-Peñalosa, "Active metamaterial structures and antennas," in *Mediterranean Electrotechnical Conf. (MELECON)*, Benalmádena, Málaga, Spain, May 2006, pp. 268–271, *invited*.
- [542] H. V. Nguyen and C. Caloz, "Metamaterial-based dual-band six-port front-end for direct digital QPSK transceiver," in *Mediterranean Electrotechnical Conf. (MELECON)*, Benalmádena, Málaga, Spain, May 2006, pp. 363–366, *invited*.
- [543] C. Caloz, "Novel passive and active transmission line metamaterial devices," in *Symp. of the Materials Research Society (MRS)*, San Francisco, CA, Apr. 2006, *invited*.
- [544] A. Rennings, S. Otto, and C. Caloz, "CRLH extended equivalent circuit (EEC) FDTD method and its application to an open metamaterial-loaded resonator," in *Int. Review of Progress in Applied Computational*

- Electromagnetics (ACES)*, Miami, FL, Mar. 2006, pp. 763–770, *invited*.
- [545] E. Amyotte, Y. Brand, C. Caloz, Y. Demers, I. Ederra, M. Gavrilovic, A. Gosh, R. Gonzalo, J. C. Iriarte, J.-D. Lacasse, J.-J. Laurin, and P. de Maagt, “Metamaterial feed networks for membrane SAR antennas,” in *Advanced SAR Workshop*, Longueuil, QC, Nov. 2005.
  - [546] C. Caloz, “Latest trends in metamaterial antennas,” in *NATO Workshop on EBG and MEMS technologies for antennas and front-ends*, Siena, Italy, Oct. 2005.
  - [547] S. Otto, A. Rennings, C. Caloz, and P. Waldow, “Dual-mode zeroth order ring resonator with tuning capability and selective mode excitation,” in *IEEE European Microw. Conf. (EuMC)*, Paris, France, Oct. 2005.
  - [548] C. Caloz and T. Itoh, “Principles and applications of dual-band operation in composite right/left-handed metamaterials,” in *General Assembly (GA)*, New Dehli, India, Oct. 2005.
  - [549] C. Caloz, “The challenge of metamaterials homogeneization: new architectures and technologies for “real-artificial” materials,” in *General Assembly (GA)*, New Dehli, India, Oct. 2005.
  - [550] Y. Horii and C. Caloz, “Super-compact composite right-/left-handed transmission line with vertically stacked left-handed unit cells,” in *General Assembly (GA)*, New Dehli, India, Oct. 2005.
  - [551] C. Caloz, “Transmission line approach of metamaterials and some of their applications,” in *Workshop on Metamaterials*, Kanpur, India, Oct. 2005.
  - [552] Y. Horii, C. Caloz, and T. Itoh, “DR-based composite right/left-handed transmission line,” in *IEICE Society Conf.*, Sapporo, Japan, Sept. 2005.
  - [553] Y. Horii, C. Caloz, and T. Itoh, “Novel metamaterial antennas and reflectors,” in *Simposium Nacional de la Union Cientifica de Radio URSI*, San Sebastian, Spain, Jul. 2005, *invited*.
  - [554] A. Lai, W.-Y. Wu, K. M. K. H. Leong, T. Itoh, and C. Caloz, “Quasi-optical manipulations of microwaves using metamaterial interfaces,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Washington, DC, Jun. 2005, *invited*.
  - [555] C. Caloz, C.-H. Ahn, and T. Itoh, “Analysis 2D finite-size metamaterials by the transmission matrix method,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Washington, DC, Jun. 2005, *invited*.
  - [556] C. A. Allen, K. M. K. H. Leong, C. Caloz, and T. Itoh, “A two-dimensional edge excited metamaterial-based leaky-wave antenna,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Washington, DC, Jun. 2005.
  - [557] S. Otto, A. Rennings, C. Caloz, P. Waldow, I. Wolff, and T. Itoh, “Composite right/left-handed  $\lambda$ -resonator ring antenna for dual-frequency operation,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Washington, DC, Jun. 2005.

- [558] A. Rennings, S. Otto, C. Caloz, and P. Waldow, “Enlarged half-wavelength resonator antenna with enhanced gain,” in *IEEE AP-S Int. Antennas Propag. (APS)*, Washington, DC, Jun. 2005.
- [559] C. Caloz and F. Taringou, “Prospects for nonlinear metamaterials,” in *CNC/USNC URSI National Radio Science Meeting*, Washington, DC, Jun. 2005, *invited*.
- [560] A. K. Saha and C. Caloz, “Ideas for homogeneous ferrimagnetic tunable left-handed structures,” in *CNC/USNC URSI National Radio Science Meeting*, Washington, DC, Jun. 2005.
- [561] Y. Horii, C. Caloz, and T. Itoh, “Left-handed behavior of capacitively coupled dielectric resonators for filter applications,” in *IEEE MTT-S Int. Microw. Symp. (IMS) Workshop on Physics, Theory, Fabrication and Application of Microwave Metamaterials*, Long Beach, CA, Jun. 2005, *invited*.
- [562] C. Caloz and T. Itoh, “CRLH metamaterials: transmission line theory, novel electromagnetic concepts and microwave applications,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Long Beach, CA, Jun. 2005.
- [563] T. Itoh and C. Caloz, “Toward homogenization of metamaterials,” in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Long Beach, CA, Jun. 2005.
- [564] Z. Ouairi, J.-J. Laurin, and C. Caloz, “Near-field based technique for composite right/left-handed media characterization,” in *Int. Conf. on Near-Field Characterization and Imaging (ICONIC)*, Barcelona, Spain, Jun. 2005.
- [565] C. Caloz, “Microwave devices based on composite right/left-handed (CRLH) transmission line metamaterials,” in *Journées Nationales Microondes*, Nantes, France, Jun. 2005, *invited* (plenary talk).
- [566] S. Otto, A. Rennings, C. Caloz, P. Waldow, and I. Wolff, “A matching technique for dual-band composite right/left-handed (CRLH) transmission line resonator antennas,” in *German Microwave Conf. (GeMIC)*, Ulm, Germany, Apr. 2005, pp. 70–73.
- [567] A. Lai, C. Caloz, and T. Itoh, “Microwave devices based on composite right/left-handed (CRLH) transmission line metamaterials,” in *IEEE Int. Workshop on Antenna Technology (IWAT)*, Singapore, Mar. 2005, pp. 69–72, *invited*.
- [568] A. Lai, T. Itoh, and C. Caloz, “Electromagnetic metamaterials: microwave applications,” in *Latsis Symp.*, Lausanne, Switzerland, Mar. 2005, p. 113, *invited*.
- [569] C. Caloz and T. Itoh, “CRLH metamaterials: transmission line theory and novel electromagnetic concepts,” in *Latsis Symp.*, Lausanne, Switzerland, Mar. 2005, pp. 14–17, *invited*.
- [570] S. Otto, A. Rennings, D. Kucsera, M. Vesterling, C. Caloz, and P. Waldow, “Dual-mode zeroth order CRLH ring resonator with tuning capability,” in *Latsis Symp.*, Lausanne, Switzerland, Mar. 2005, p. 97.

- [571] Y. Horii, C. Caloz, S.-M. Han, and T. Itoh, "A super-compact diplexer composed of multi-layered composite right/left-handed transmission lines," in *IEEE Asia Pacific Microw. Conf. (APMC)*, New Dehli, India, Dec. 2004.
- [572] S. Otto, C. Caloz, A. Sanada, and T. Itoh, "A dual-frequency composite right/left-handed half-wavelength resonator antenna," in *IEEE Asia Pacific Microw. Conf. (APMC)*, New Dehli, India, Dec. 2004.
- [573] C. Caloz and T. Itoh, "Microwave component applications of composite right/left-handed structures," in *IEEE European Microw. Conf. (EuMC) Tutorial on Left-Handed Metamaterials, Circuits and their Technical Applications*, Amsterdam, Netherlands, Oct. 2004, *invited*.
- [574] C.-J. Lee, C. Caloz, K. M. K. H. Leong, S. M. Han, and T. Itoh, "A planar broadband antenna for UWB pulse transmission," in *IEEE European Microw. Conf. (EuMC)*, Amsterdam, Netherlands, Oct. 2004, pp. 1330–1331.
- [575] A. Sanada, M. Kimura, I. Awai, H. Kubo, C. Caloz, and T. Itoh, "A planar zeroth order resonator antenna using a left-handed transmission line," in *IEEE European Microw. Conf. (EuMC)*, Amsterdam, Netherlands, Oct. 2004, pp. 1341–1344.
- [576] Y. Horii, C. Caloz, and T. Itoh, "Vertical multi-layered implementation of a purely left-handed transmission line for super-compact and dual-band devices," in *IEEE European Microw. Conf. (EuMC)*, Amsterdam, Netherlands, Oct. 2004, pp. 471–473.
- [577] S. Lim, C. Caloz, and T. Itoh, "Beamwidth tuning in a composite right/left handed (RDLH) leaky-wave antenna using non-uniformly biased varactors," in *IEEE European Microw. Conf. (EuMC)*, Amsterdam, Netherlands, Oct. 2004, pp. 1077–1080.
- [578] Y. Horii, C. Caloz, and T. Itoh, "Compact multi-layered left-handed transmission line," in *IEICE Society Conf.*, Tokushima, Japan, Oct. 2004, p. 75.
- [579] C. Caloz and T. Itoh, "Microwave applications of metamaterial structures," in *IEICE Society Conf.*, Sapporo, Japan, Jul. 2004, pp. 135–138, *invited*.
- [580] M. Kang, C. Caloz, and T. Itoh, "Miniaturized MIM CRLH transmission line structure and application to backfire-to-endfire leaky-wave antenna," in *IEEE AP-S Int. Antennas Propag. (APS)*, Monterey, CA, Jun. 2004.
- [581] C. Caloz and T. Itoh, "Unusual propagation characteristics in CRLH periodic structures," in *IEEE AP-S Int. Antennas Propag. (APS)*, Monterey, CA, Jun. 2004.
- [582] C. Caloz, C.-J. Lee, D. R. Smith, J. B. Pendry, and T. Itoh, "Existence and properties of microwave surface plasmons at the interface between a right-handed and a left-handed media," in *IEEE AP-S Int. Antennas Propag. (APS)*, Monterey, CA, Jun. 2004.



- [583] S. Lim, C. Caloz, and T. Itoh, "Constant-frequency voltage-scanned reflecto-directive system," in *IEEE AP-S Int. Antennas Propag. (APS)*, Monterey, CA, Jun. 2004.
- [584] C. Caloz, A. Lai, and T. Itoh, "Wave interactions in a lh mushroom structure," in *IEEE AP-S Int. Antennas Propag. (APS)*, Monterey, CA, Jun. 2004, *invited*.
- [585] S. Lim, C. Caloz, and T. Itoh, "A continuously-electronically-scanned leaky-wave antenna using series and shunt varactors," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Fort Worth, TX, Jun. 2004, pp. 313–316.
- [586] C. A. Allen, C. Caloz, and T. Itoh, "Leaky-waves in a metamaterial-based two-dimensional structure for a conical beam antenna application," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Fort Worth, TX, Jun. 2004, pp. 305–308.
- [587] C. Caloz and T. Itoh, "Metamaterial structures for microwave circuit components," in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Pisa, Italy, May 2004, pp. 954–956, *invited* (plenary talk).
- [588] C. Caloz and T. Itoh, "Particular effects in composite right/left-handed materials: losses, finite size, varactors," in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Pisa, Italy, May 2004, pp. 885–887, *invited*.
- [589] C. Caloz, S. Lim, C. A. Allen, and T. Itoh, "Leakage phenomena from negative refractive index structures," in *URSI Int. Symp. on Electromagnetic Theory (EMTS)*, Pisa, Italy, May 2004, pp. 156–158, *invited*.
- [590] C. Caloz and T. Itoh, "1D and 2D leaky-wave antennas based on metamaterials concepts," in *ESA Antenna Technology Workshop on Innovative Periodic Antennas*, Santiago de Compostela, Spain, Mar. 2004, pp. 167–174, *invited*.
- [591] S. Lim, C. Caloz, and T. Itoh, "Metamaterial-based electronic antennas," in *CNC/USNC URSI National Radio Science Meeting*, Boulder, CO, Jan. 2004, p. 118, *invited*.
- [592] A. Sanada, C. Caloz, and T. Itoh, "Characteristics and applications of planar negative refractive index media," in *Microwave and Workshop Exhibition (MWE)*, Yokohama, Japan, Nov. 2003, pp. 61–66, *invited*.
- [593] C. Caloz, A. Sanada, and T. Itoh, "Microwave applications of transmission-line based negative refractive index structures," in *IEEE Asia Pacific Microw. Conf. (APMC)*, Seoul, South Korea, Nov. 2003, pp. 1708–1713.
- [594] A. Sanada, C. Caloz, and T. Itoh, "A novel zeroth order resonance in composite right/left-handed transmission line resonators," in *IEEE Asia Pacific Microw. Conf. (APMC)*, Seoul, South Korea, Nov. 2003, pp. 1588–1592.

- [595] C. Caloz and T. Itoh, "A quick overview of novel metamaterials and applications," in *Workshop on Microwave EBGs and Meta-materials*, Rennes, France, Nov. 2003, *invited*.
- [596] C. Caloz and T. Itoh, "Novel microwave applications using composite right/left-handed circuits and structure," in *Progress in Electromagnetics Research Symp. (PIERS)*, Waikiki, HI, Oct. 2003, p. 478, *invited*.
- [597] C. Caloz, A. Sanada, and T. Itoh, "Distortion suppression using composite right/left-handed metamaterials," in *Progress in Electromagnetics Research Symp. (PIERS)*, Waikiki, HI, Oct. 2003, p. 97, *invited*.
- [598] C. Caloz, A. Sanada, C. A. Allen, and T. Itoh, "A novel composite right/left-handed textured radiative surface," in *Progress in Electromagnetics Research Symp. (PIERS)*, Waikiki, HI, Oct. 2003, p. 201, *invited*.
- [599] C. Caloz, A. Sanada, and T. Itoh, "Distortion suppression using composite right/left-handed metamaterials," in *Progress in Electromagnetics Research Symp. (PIERS)*, Waikiki, HI, Oct. 2003, p. 97, *invited*.
- [600] A. Sanada, C. Caloz, and T. Itoh, "2D distributed periodic structures with anisotropic RH and LH characteristics," in *Progress in Electromagnetics Research Symp. (PIERS)*, Waikiki, HI, Oct. 2003, p. 23, *invited*.
- [601] C. Caloz, A. Sanada, and T. Itoh, "Microwave applications of transmission-line based negative refractive index structures," in *IEEE European Microw. Conf. (EuMC)*, Munich, Germany, Oct. 2003, pp. 105–108.
- [602] S. Lim, C. Caloz, and T. Itoh, "Novel arbitrary angle leaky-wave reflector using heterodyne mixing," in *IEEE European Microw. Conf. (EuMC)*, Munich, Germany, Oct. 2003, pp. 715–718.
- [603] C. Caloz, S. Lim, and T. Itoh, "A novel leaky-wave retrodirective reflector using short/matched terminations," in *IEEE European Microw. Conf. (EuMC)*, Munich, Germany, Oct. 2003, pp. 1071–1074.
- [604] C. Caloz and T. Itoh, "Periodic microwave applications of novel metamaterials," in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2003, pp. 427–430, *invited*.
- [605] C. Caloz, A. Sanada, and T. Itoh, "Periodic structures with unusual EM properties," in *Int. Conf. on Electromagnetics Advanced Applications (ICEAA)*, Turin, Italy, Sept. 2003, pp. 647–650, *invited*.
- [606] C. Caloz and T. Itoh, "Novel artificial material concepts and structures for microwave applications," in *Int. PhD School on Selected Topics in Applied Electromagnetics*, Perugia, Italy, Sept. 2003, *invited*.
- [607] C. Caloz and T. Itoh, "Microwave applications of meta-structures with novel guided, radiative and refractive effects," in *Int. Conf. on Infrared and Millim. Waves and THz (IRMMW-THz)*, Otsu, Japan, Sept. 2003, pp. 3–4, *invited*.

- [608] H. Okabe, C. Caloz, and T. Itoh, "Miniaturization and bandwidth enhancement of a hybrid ring using a left-handed transmission line section," in *IEICE Society Conf.*, Niigata, Japan, Sept. 2003, p. 85.
- [609] C. Caloz and T. Itoh, "Novel microwave devices and structures based on the transmission line approach of meta-materials," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Philadelphia, PA, Jun. 2003, pp. 195–198, *invited*.
- [610] I.-H. Lin, C. Caloz, and T. Itoh, "A branch-line coupler with two arbitrary operating frequencies using left-handed transmission lines," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Philadelphia, PA, Jun. 2003, pp. 325–327.
- [611] H. Okabe, C. Caloz, and T. Itoh, "A compact enhanced-bandwidth hybrid ring using a left-handed transmission line section," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Philadelphia, PA, Jun. 2003, pp. 329–332.
- [612] C. Caloz, A. Sanada, L. Liu, and T. Itoh, "A broadband left-handed (LH) coupled-line backward coupler with arbitrary coupling level," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Philadelphia, PA, Jun. 2003, pp. 317–320.
- [613] J. Ho, J.-Y. Park, C. Caloz, and T. Itoh, "A compact subdivided microstrip square patch array with low mutual coupling," in *IEEE AP-S Int. Antennas Propag. (APS)*, Columbus, OH, Jun. 2003.
- [614] C. Caloz, A. Sanada, and T. Itoh, "Surface plasmons at the interface between right-handed and left-handed 2D metamaterials," in *IEEE AP-S Int. Antennas Propag. (APS)*, Columbus, OH, Jun. 2003, *invited*.
- [615] A. Sanada, C. Caloz, and T. Itoh, "2D distributed meta-structures with refractive focusing properties," in *IEEE AP-S Int. Antennas Propag. (APS)*, Columbus, OH, Jun. 2003, *invited*.
- [616] C. Caloz, I.-H. Lin, and T. Itoh, "Orthogonal anisotropy in 2D PBG structures and metamaterials," in *IEEE AP-S Int. Antennas Propag. (APS)*, Columbus, OH, Jun. 2003, *invited*.
- [617] C. Caloz and T. Itoh, "Passive distributed periodic structures: Bragg diffraction and long-wavelength refraction phenomena," in *IEEE AP-S Int. Antennas Propag. (APS)*, Columbus, OH, Jun. 2003, *invited*.
- [618] I.-H. Lin, C. Caloz, and T. Itoh, "Transmission line approach of left-handed (LH) non-uniform transmission lines (NTL)," in *IEEE Asia Pacific Microw. Conf. (APMC)*, Kyoto, Japan, Nov. 2002, pp. 1501–1504, *invited*.
- [619] C. Caloz and T. Itoh, "Left-handed transmission lines and equivalent metamaterials for microwave and millimeter-wave applications," in *IEEE European Microw. Conf. (EuMC)*, Milan, Italy, Sept. 2002, pp. 323–326, *invited*.
- [620] C. Caloz and T. Itoh, "Left-handed (LH) transmission lines and filters with low-loss and broadband characteristics," in *General Assembly (GA)*, Maastricht, Netherlands, Aug. 2002, *invited*.

- [621] C. Caloz and T. Itoh, "A super-compact super-broadband tapered PBG structure for microwave and millimeter-wave applications," in *IEEE MTT-S Int. Microw. Symp. (IMS)*, Seattle, WA, Jun. 2002, pp. 1919–1923, *invited*.
- [622] C. Caloz, H. Okabe, T. Iwai, and T. Itoh, "Anisotropic PBG surface and its transmission line model," in *CNC/USNC URSI National Radio Science Meeting*, San Antonio, TX, Jun. 2002, p. 224, *invited*.
- [623] C. Caloz, H. Okabe, T. Iwai, and T. Itoh, "Transmission line approach of left-handed (LH) materials," in *CNC/USNC URSI National Radio Science Meeting*, San Antonio, TX, Jun. 2002, p. 39, *invited*.
- [624] C. Caloz and T. Itoh, "Application of the transmission line theory of left-handed (LH) materials to the realization of a microstrip lh transmission line," in *IEEE AP-S Int. Antennas Propag. (APS)*, San Antonio, TX, Jun. 2002, pp. 412–415, *invited*.
- [625] J.-Y. Park, C. Caloz, Y. Qian, and T. Itoh, "A compact subdivided square microstrip patch antenna for C-band applications," in *IEEE Asia Pacific Microw. Conf. (APMC)*, Taipei, Taiwan, Dec. 2001, pp. 1143–1146.
- [626] C.-C. Chang, C. Caloz, and T. Itoh, "Analysis of a compact slot resonator in the ground plane for microstrip structures," in *IEEE Asia Pacific Microw. Conf. (APMC)*, Taipei, Taiwan, Dec. 2001, pp. 1100–1103.
- [627] C. Caloz, C.-C. Chang, and T. Itoh, "A novel multilayer super-compact inharmonic photonic band-gap (PBG) structure for microstrip applications," in *IEEE Asia Pacific Microw. Conf. (APMC)*, Taipei, Taiwan, Dec. 2001, pp. 651–654.
- [628] C. Caloz and T. Itoh, "Characterization of the novel uniplanar compact photonic band-gap ground plane (UC-PBG-GP)s," in *Topical Meeting on Electrical Performance of Electronic Packaging (EPEP)*, Cambridge, MA, Oct. 2001, pp. 17–21.
- [629] C. Caloz, C.-C. Chang, and T. Itoh, "A novel anisotropic uniplanar compact photonic band-gap (UC-PBG) ground plane," in *IEEE European Microw. Conf. (EuMC)*, London, UK, Sept. 2001, pp. 185–187.
- [630] C. Caloz, Y. Qian, C.-C. Chang, and T. Itoh, "A novel multilayer photonic band-gap (PBG) structure for microstrip circuits and antennas," in *CNC/USNC URSI National Radio Science Meeting*, Boston, MA, Jul. 2001, pp. 502–505.
- [631] C. Caloz, A. K. Skrivervik, and F. E. Gardiol, "Green's functions in photonic crystals and their potential applications to microstrip antennas," in *IEEE AP-S Millennium Conf. Antennas Propag.*, Davos, Switzerland, Apr. 2000.
- [632] C. Caloz, D. Curcio, A. Alvarez-Melcon, A. K. Skrivervik, and F. E. Gardiol, "Slot antenna on a photonic substrate: Green's functions study," in *SPIE Annual Meeting and Exhibition*, Denver, CO, Jul. 1999, pp. 176–187.

- [633] C. Caloz, J.-F. Zürcher, and A. K. Skrivervik, “Measurement of a 2D photonic crystal in a waveguide,” in *Journées Internationales de Nice sur les Antennes*, Nice, France, Nov. 1999, pp. 627–630.

## Books and Book Chapters

- [634] K. Achouri, Y. Vahabzadeh, and C. Caloz, “Metasurface synthesis, analysis and applications,” in *Frontiers in Surface Electromagnetics and Modern Applications*, F. Yang and Y. Rahmat-Samii, Eds. **Wiley**, 2017.
- [635] S. Gupta and C. Caloz, “Real-time electromagnetic signal processing: Principles and illustrations,” in *Wave Propagation*. **InTech**, 2016.
- [636] K. Achouri and C. Caloz, “Metasurface synthesis, characterization and applications,” in *Handbook of Metamaterials and Nanophotonics*, E. Shamonina, Ed. **World Scientific**, 2016.
- [637] S. Gupta and C. Caloz, “Metamaterial processing,” in *Broadband Metamaterials in Electromagnetics: Technology and Applications*, D. H. Werner, Ed. **Pan Stanford Scientific**, 2015.
- [638] M. A. Salem and C. Caloz, “Localized waves: Theory and experiments,” in *Handbook of Antenna Technologies*, Z. N. Chen, Ed. **Springer**, 2015.
- [639] D. L. Sounas and C. Caloz, *Non-reciprocity in Magnetically-biased Graphene at Microwave and Terahertz Frequencies*. **CRC Encyclopedia**, 2012.
- [640] D. L. Sounas and C. Caloz, *Novel Electromagnetic Phenomena in Graphene and Subsequent Microwave Devices Enabled by Multi-scale Metamaterials*. **InTech**, 2012.
- [641] J. S. Gómez-Díaz, S. Gupta, A. Alvarez-Melcon, and C. Caloz, *Impulse-Regime Analysis of Novel Optically-Inspired Phenomena at Microwaves*. **InTech**, 2012.
- [642] C. Caloz, D. R. Jackson, and T. Itoh, “Leaky-wave antennas (chap. 9),” in *Frontiers in Antennas: Next Generation Design and Engineering*, F. B. Gross, Ed. **McGraw Hill**, 2011.
- [643] C. Caloz, “Metamaterial antennas and radiative systems (chap. 11),” in *Microstrip and Printed Antennas: New Trends, Techniques and Applications*, D. Guha and Y. M. M. Antar, Eds. **IEEE Press**, 2011.
- [644] A. Rennings, A. Lauer, C. Caloz, and I. Wolff, “Equivalent circuit (EC) FDTD method for dispersive materials: Derivation, stability criteria and application examples,” in *Time Domain Methods in Modern Engineering Electrodynamics*, P. Russer and U. Siart, Eds. **Springer**, 2008.
- [645] M. Zedler, C. Caloz, and P. Russer, “A 3D isotropic left-handed metamaterial based on the rotated TLM scheme,” in *Time Domain Methods in Modern Engineering Electrodynamics*, P. Russer and U. Siart, Eds. **Springer**, 2008.
- [646] C. Caloz and T. Itoh, “CRLH metamaterial antennas, part I: Theory and antenna-related concepts (chap. 15),” in *Handbook on Metamaterials: Phenomena, Theory, and Applications*, F. Capolino, Ed. **CRC**, 2008.
- [647] C. Caloz and T. Itoh, “CRLH metamaterial antennas, part II: Leaky-wave and resonant antennas (chap. 16),” in *Handbook on Metamaterials: Phenomena, Theory, and Applications*, F. Capolino, Ed. **CRC**, 2008.

- [648] C. Caloz and T. Itoh, “Microwave coupler and resonator applications of negative-index planar structures (chap. 7),” in *Electromagnetic Metamaterials: Physics and Engineering Aspects*, N. Engheta and R. W. Ziolkowski, Eds. **Wiley - IEEE Press**, 2006.
- [649] C. Caloz, “From Bragg structures to micro-engineered materials, in periodic structures,” in *Electromagnetic Metamaterials: Physics and Engineering Aspects*, M. Bozzi, Ed. **Research Signpost**, 2006.
- [650] C. Caloz and T. Itoh, *Electromagnetic Metamaterials, Transmission Line Theory and Microwave Applications*. **Wiley - IEEE Press**, 2006.

## Colloquia and Seminars

- [651] Technical University of Denmark, Copenhagen, Sweden, Mar. 18, 2016.
- [652] Swedish Microwave Days, Linköping, Sweden, Mar. 16, 2016.
- [653] Télécom ParisTech, Paris, France, Feb. 3, 2016.
- [654] University of Toulouse, Toulouse, France, Feb. 2, 2016.
- [655] University of Rennes 1, Rennes, France, Feb. 1, 2016.
- [656] King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand, Dec. 3, 2015.
- [657] University of Adelaide, Adelaide, South Australia, Australia, Nov. 18, 2015.
- [658] Australian Defense Force Army, Canberra, Australian Capital Territory, Australia, Nov. 16, 2015.
- [659] RMIT University, Melbourne, Victoria, Australia, Nov. 12, 2015.
- [660] Macquarie University, Sydney, New South Wales, Australia, Nov. 6, 2015.
- [661] The University of Queensland, Brisbane, Queensland, Australia, Nov. 5, 2015.
- [662] University of Syracuse, Syracuse, NY, USA, Sept. 30, 2015.
- [663] Sapienza University of Rome, Rome, Italy, Sept. 11, 2015.
- [664] University of Siena, Siena, Italy, Sept. 10, 2015.
- [665] City University of Hong Kong, Hong Kong, China, Jul. 7, 2015.
- [666] University of Macao, Macao, China, Jul. 6, 2015.
- [667] South University of Science and Technology of China (SUSTC), Shenzhen, China, Jul. 3, 2015.
- [668] Tongji University, Shanghai, China, Jul. 2, 2015.
- [669] National University of Singapore Suzhou Research Institute (NUSRI), Suzhou, China, Jul. 1, 2015.
- [670] King Abdulaziz University, Jeddah, Saudi Arabia, May 4, 2015.
- [671] Swiss Federal Institute of Technology (EPFL), Lausanne, Switzerland, Apr. 21, 2015.
- [672] University of Coimbra, Coimbra, Spain, Apr. 10, 2015.
- [673] Pennsylvania State University, State College, PA, USA, Feb. 19, 2015.
- [674] University of of Central Florida, Orlando, FL, USA, Feb. 17, 2015.
- [675] The University of Texas at Arlington, Arlington, TX, USA, Feb. 16, 2015.
- [676] 14th Mediterranean Microw. Symp., Marrakech, Morocco, Dec. 14, 2014.



- [677] Concordia University, Montreal, QC, Canada, Nov. 17, 2014.
- [678] University of California at Los Angeles, Los Angeles, CA, USA, May 29, 2014.
- [679] A\* Institute of High Performance Computing, Singapore, May 23, 2014.
- [680] McGill University, Montréal, QC, Canada, May 9, 2013.
- [681] University of Tokyo, Tokyo, Japan, Feb. 21, 2013.
- [682] Physikzentrum Bad Honnef, Bad Honnef, Germany, Sept. 26, 2011.
- [683] Concordia University, Montréal, QC, Canada, Aug. 31, 2011.
- [684] École Polytechnique de Montréal, Montréal, Canada, May 30, 2011.
- [685] University of Illinois at Urbana Champaign, Urbana and Champaign, IL, USA, Mar. 10, 2011.
- [686] Research In Motion, Waterloo, ON, Canada, Dec. 13, 2010.
- [687] Institut National des Sciences Appliquées, Lyon, France, Nov. 22, 2010.
- [688] Swiss Federal Institute of Technology Zurich (ETHZ), Zurich, Switzerland, Oct. 5, 2010.
- [689] Sherbrooke University, Montréal, QC, Canada, Jun. 10, 2010.
- [690] Université de Montréal, Montréal, QC, Canada, May 14, 2010.
- [691] Ultra Electronics, Montréal, QC, Canada, Mar. 21, 2010.
- [692] University of California at Los Angeles, Los Angeles, CA, CA, Jan. 26, 2010.
- [693] INP-Esisar, LCIS, Grenoble, France, Dec. 4, 2009.
- [694] PROMPT, Montréal, QC, Canada, Nov. 18, 2009.
- [695] École Polytechnique de Montréal, Montréal, QC, Canada, May 29, 2009.
- [696] Los Alamos National Laboratory, Los Alamos, NM, USA, May 18, 2009.
- [697] University of Duisburg, Duisburg, Germany, Sept. 18, 2008.
- [698] École Polytechnique de Montréal, Montréal, QC, Canada, Apr. 15, 2008.
- [699] Tokyo Institute of Technology, Tokyo, Japan, Dec. 8, 2007.
- [700] Mitsubishi, Tokyo, Japan, Dec. 7, 2007.
- [701] MTT-S Kansai Chapter, Kyoto, Japan, Dec. 6, 2007.
- [702] Panasonic, Kyoto, Japan, Dec. 6, 2007.
- [703] Hanyang University, Seoul, South Korea, Oct. 19, 2007.
- [704] Korea Electromagnetic Engineering Society, Seoul, South Korea, Oct. 18, 2007.

- [705] Soonchunhyang University, Asan, South Korea, Oct. 17, 2007.
- [706] Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne, Switzerland, Oct. 8, 2007.
- [707] Technical University of Munich, Munich, Germany, Oct. 4, 2007.
- [708] Los Alamos National Laboratory, Los Alamos, NM, USA, Sept. 5, 2007.
- [709] University of Stuttgart, Stuttgart, Germany, Jul. 16, 2007.
- [710] Canadian Space Agency, Montréal, QC, Canada, Oct. 12, 2006.
- [711] Physikzentrum Bad Honnef, Bad Honnef, Germany, Sept. 18, 2006.
- [712] Forschungsgesellschaft für Angewandte Naturwissenschaften (FGAN) Institute, Wachtberg, Germany, Sept. 15, 2006.
- [713] Sherbrooke University, Sherbrooke, QC, Canada, May 25, 2006.
- [714] McGill University, Montréal, QC, Canada, Mar. 28, 2006.
- [715] École Polytechnique de Montréal, Montréal, QC, Canada, Jan. 15, 2006.
- [716] Los Alamos National Laboratory, Los Alamos, NM, USA, Jan. 19, 2006.
- [717] Indian Institute of Technology, Kanpur, India, Oct. 29, 2005.
- [718] Institut National de la Recherche Scientifique, Varennes, QC, Canada, Jan. 19, 2005.
- [719] Technical University of Madrid, Madrid, Spain, Mar. 10, 2004.
- [720] Trex Enterprise, San Diego, CA, USA, Nov. 21, 2003.
- [721] University of Perugia, Perugia, Italy, Sept. 8, 2003.
- [722] Qualcomm, San Diego, CA, USA, Aug. 15, 2003.
- [723] Lockheed Martin, Palmdale, CA, USA, Mar. 11, 2003.
- [724] Bell Laboratories, Murray Hill, NJ, USA, Jan. 15, 2003.

## Patents and Inventions

- [725] L. Zou, S. Gupta, and C. Caloz, “Ultrafast RF pulse generator and modulator (UPGM),” *Poly DIV-717*, Feb. 2016.
- [726] L. Zou, S. Gupta, and C. Caloz, “Reconfigurable phaser using loss-gain equalized C-section pairs,” *Poly DIV-716*, Feb. 2016.
- [727] C. Caloz, A. Al-Bassam, and M. A. Salem, “Orbital angular momentum (OAM) circular leaky-wave antenna (CLWA) multiplexer,” *US 62/002,978*, Dec. 2013.
- [728] B. Nikfal, M. Salem, and C. Caloz, “A method and apparatus for encoding data using instantaneous frequency dispersion,” *US 62/002,978*, Nov. 2013.
- [729] C. Caloz, H. V. Nguyen, and S. Abielmona, “Highly-efficient power-recycling end-switched electronically-scanned leaky-wave antenna,” Feb. 2012.
- [730] S. Abielmona, J.-F. Frigon, C. Caloz, and H. V. Nguyen, “Method and algorithm for assessing the quality of a wireless communication link between nodes having reconfigurable directional antennas,” *US 61/567523*, Jan. 2012.
- [731] C. Caloz, T. Kodera, and D. L. Sounas, “Artificial magnetic material, artificial magnetic material device, artificial magnetic material reflecting wall, and artificial magnetic material transparent wall,” *PCT/CA2011/001422*, Dec. 2011.
- [732] S. Abielmona, C. Caloz, and H. V. Nguyen, “Polarization-diverse composite right/left-handed leaky-wave antennas and systems,” *US 61/567505*, Dec. 2011.
- [733] C. Caloz, H. V. Nguyen, S. Abielmona, and N. Yang, “Circularly-polarized composite right/left-handed leaky-wave antenna using longitudinal and transversal radiation currents,” *US 61/350,055*, Oct. 2011.
- [734] C. Caloz, H. V. Nguyen, S. Abielmona, and S. Gupta, “Tunable delay system and corresponding method,” *US 2011/0248797 A1*, Oct. 2011.
- [735] H. V. Nguyen, A. Parsa, C. Caloz, and S. Abielmona, “Device and method for improving leaky wave antenna radiation efficiency,” *WO 2011/069253 A1*, Jun. 2011.
- [736] C. Caloz, H. V. Nguyen, and S. Abielmona, “End-switched CRLH leaky-wave antenna with enhanced electronic full-space beam steering performance,” *US 61/472,849*, Apr. 2011.
- [737] J.-F. Frigon, C. Caloz, S. Abielmona, and H. V. Nguyen, “System for controlling a radiation pattern of a directional antenna,” *WO 2010/094132 A1*, Aug. 2010.
- [738] T. Itoh, C. Caloz, I.-H. Lin, and H. Okabe, “Composite right/left-handed (CRLH) branch-line couplers,” *US 7667555*, Feb. 2009.

- [739] J.-F. Frigon and C. Caloz, "Dynamic radiation pattern antenna system," *WO 2009/067802 A1*, Jun. 2009.
- [740] T. Itoh, C. Caloz, I.-H. Lin, and H. Okabe, "Composite right/left-handed (CRLH) couplers," *US 7508283*, Mar. 2009.
- [741] T. Itoh, A. Sanada, and C. Caloz, "Zeroth-order resonator," *US 7391288*, Jun. 2008.