Curriculum Vitae: Harry Contopanagos, Ph.D. (updated December 2021)

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Institute of Nanoscience and Nanotechnology
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WORK EXPERIENCE

9/04 – Present: Director of Research (since 2013)
Institute of Nanoscience & Nanotechnology (INN)
National Center for Scientific Research "Demokritos", Athens, Greece

Conducts research in RF/mm-waves Microelectronics and Nanotechnology. Extended the Institute's competencies in the area of High-Frequency Electromagnetics, Antennas and Antenna Arrays, RF Integrated systems for wireless communications applications, Photonic Crystals/Metamaterials applied to novel RF systems and System-on-chip RFIC technology. Collaborated in INN research activities on optical waveguides and sensors. Initiated new research into analytical methods for causal circuit modeling of arbitrarily large bandwidths for multiport linear networks at arbitrary frequencies. Extensive R&D on 60 GHz/high-frequency 5G antennas and arrays integrated on-package of radio transceiver chips. Expert in analytical and numerical analysis and design of such systems, including custom coding. Expert in commercial full-wave codes, including HFSS, Designer, IE3D, Microwave Office, Sonnet.

Created the Institute's RF measurement and characterization Lab, maintained its ISO9001 certification. Extensive measurement and characterization experience of microwave/mm-wave devices.

Co-directed the Ph.D. work of Dr. P. Zacharatos (2006-2009, in collaboration with Dr. A. Nassiopoulou of INN) and of Dr. P. Broutas (2010-2013, in collaboration with Dr. D. Tsoukalas of National Technical University of Athens and Dr. S. Hatzandroulis of INN) and was member of the corresponding doctoral committees.

11/17 – 10/19: Senior Principal Scientist, Energous Corporation, San Jose, California, USA
& Private Consultant
(*on Leave of Absence from INN*)

At Energous, performed advanced R&D and Product Development for novel antennas and smart arrays for wireless charging systems using Radio Frequencies. Developed novel Electromagnetic Wave Focusing Techniques and realized them into electronically programmable antenna array systems with optimized link budgets. Theoretical analysis, design/prototyping, full experimental characterization, patented IP. Invented eight issued antenna/array patents and three more pending patents. Private consultancy included analysis and design of novel phase shifters and antenna architectures for mm-wave 5G systems.

3/14 – 2/16: Antenna Engineering Consultant, Energous Corporation, San Jose, California, USA
(*on Leave of Absence from INN*)

Designed, characterized and integrated a variety of antennas and arrays operating at 5.8 GHz and 915 MHz, for Transmitter and Receiver (handheld) architectures: Printed Circularly Polarized antennas and arrays, Printed Dual-polarization antennas and arrays, Embedded Multi-slotted PIFA antennas and arrays, novel Metamaterial Dual-polarization antennas and arrays, Wearable antennas, compact printed Quasi-Yagi antennas and arrays, Dielectric Resonator antennas and arrays. New IP generation. Invented Radiative Metamaterials, disclosed in the patent "Radiating metamaterial antenna for wireless charging". HFSS, Designer design/simulation environments.

6/03 – 7/04: Director of Advanced R & D, Ethertronics Corporation, San Diego, California, USA

Expert in Antenna design and integration. Directed all phases of advanced Research and Development of High-Technology embedded multi-band antennas for wireless communications in mobile telephony at all international frequency bands, Wireless-LAN and Bluetooth devices. Inventor of "Volume Reuse Antennas" a patented technology that increased antenna bandwidth by ×3. Designed and delivered into production novel Matching Network and Filter architectures integrated with embedded antennas, for bandwidth enhancement and RFIC integration. HFSS, Designer design/simulation environments.

11/00 – 11/02: Principal Scientist, RF and Advanced Mixed Signal Business Unit,
Broadcom Corporation, Irvine, California, USA

Concentrated on RFIC R&D, Design and Product Development: Designed, modeled and measured on-chip passives libraries in CMOS technologies, including 0.35μm, 0.18 μm, and 0.13 μm technologies. Doubled inductor Q-factors compared to previous performance. Designed and measured on-chip filters in CMOS, incorporating cross-coupled FETs, for integration on Bluetooth and 802.11a/b single-chip radios. HFSS, IE3D, Microwave Office, Sonnet and Cadence Simulation/Layout/Verification environments.

5/99 – 11/00: Senior Research Scientist, Hughes Research Laboratories, Malibu, California, USA

Electromagnetics Research: Main inventor of well-conditioned algorithm for accurate electromagnetic scattering from complicated targets, with 10-fold speedup of resulting codes. Corresponding publication cited 156 times. Designed optimized phase shifters with novel constrained optimization synthesis.

Wireless Communications Research: Created and coded novel physical modeling of Multipath Interference in wireless communications, with emphasis on Urban High-rise propagation environments.

Quantum Computers Research: Hardware design of novel reversible logic gates based on electromagnetic multi-state interference based on novel Bragg-reflector waveguide filters for executing super-fast arithmetic of realized Quantum Sorting Algorithms.

12/96 – 4/99: Associate Research Engineer, Electrical Engineering Department
University of California Los Angeles (UCLA), Los Angeles, California, USA

Electromagnetics Research: Expert in Photonic Crystals (PCs): Co-developed their analytical theory for physical characterization/design optimization and fast numerical coding. RF Microstrip Filters, mm-wave Waveguide Filters, RF high-Q metalo-dielectric cavities. Analyzed Packaged Printed Circuit Antennas on or under PC layers and UV/EUV Metallic Bragg Reflectors.

Design, Prototype Fabrication & Measurements: Novel Monolithic Waveguide Filters fabricated by Metalo-Dielectric PCs, for X up to Ka- band waveguides, based on our theory of thin PCs. Micro-strip Filters printed on PCs. Patch Antennas printed on thin PCs for surface-wave/back-scattering elimination.

Software & Laboratory Experience: Experience in HFSS, Designer, Sonnet, IE3D, Microwave Office, AutoCad, Cadence. Expertise in photolithography and measurements on Vector Network Analyzers (DC-50GHz) and in anechoic chambers for antenna radiation pattern measurements.

9/93 – 11/96: Postdoctoral Researcher, High-Energy Physics Division,
Argonne National Laboratory, Chicago, Illinois, USA

Research in Theoretical High-Energy Physics/Quantum Chromodynamics (QCD): Applied Principal-Value Resummation, that he co-invented, to QCD. Predicted the Top-Quark production cross section at FERMILAB (USA) and CERN (Europe) energies, in excellent agreement with subsequent experiments. Co-developed the theory of Sudakov Factorization and Resummation in QCD. 4 publications rank in the "world's very well-known papers" with 276, 266, 211 and 148 citations, respectively.

9/91 – 8/93: Postdoctoral Researcher, Institute for Theoretical Physics,
State University of New York (SUNY) Stony Brook, New York, USA

Research in Theoretical Quantum Electrodynamics (QED) and QCD: Extented the theory of asymptotic Hilbert spaces, which he invented in his Ph.D., to massless QED and QCD. Co-invented with Prof. G. Sterman the theory of Principal-Value Resummation for QCD. Applied the theory to the Drell-Yan process.1 publication ranks in the "world's very well-known papers" with 171 citations.

EDUCATION

Ph.D. (Physics) 8/91, M.Sc. (Physics) 8/89; University of Michigan, Ann Arbor, USA (9/86-8/91)
Performance: Ranked 1st in all graded classes; *GPA*: 4 (absolute excellent).

B.Sc. (Physics) 4/84; National University of Athens, Athens, Greece (10/79-4/84)
Performance: Earned 2nd grade in the 1979 National Entrance Examinations among all Physics departments in Greece. Valedictorian with Graduation Grade 9.42 (0-10.00 scale, A=8.50).

Languages: Greek (Native), English (Native or Bilingual ability; 20-year U.S. resident), French (Full professional proficiency).

HONORS AND AWARDS

- Cover of Physica Status Solidi a, Vol. 204, No. 5, 2007, for the publication "Integrated Inductors on Porous Silicon", H. Contopanagos and A. Nassiopoulou.
- 1st Prize for Best Business Plan, 6th International Venture Capital Forum, 6/2005, Athens, Greece.
- Awarded the Marie Curie International Reintegration Fellowship, European Union, 2005-2007.
- Awarded the *Horace H. Rackham Predoctoral Fellowship*, University of Michigan, for top academic performance among all predoctoral university candidates, 1989-1990.
- Awarded the *F. Knoller Academic Excellence Award*, University of Michigan, 1988.
- 2 separately awarded *Block Academic Excellence Fellowships*, University of Michigan, 1987A, B.
- 4 separately awarded *IKY Scholarships*, National Scholarships Foundation (Greece), for exceptional academic performance in each year of undergraduate studies at the University of Athens, 1983, 1982, 1981, 1980.
- Awarded the *IKY Scholarship*, for earning the 2nd highest grade in the 1979 National University Entrance Examinations among all Physics Departments candidates in Greece, 1979.

PARTICIPATION AND/OR CONTRIBUTION IN FOUNDING HIGH-TECH START-UPS

8/21 – Present:
Contributed in founding Argo Semiconductors, a high-tech start-up based in Athens, Greece, active in producing in fabless mode novel chipsets and antenna arrays for present and future 5G and 6G wireless communications applications. Directs the antenna R&D and product development activities of the company and their integration into its RF front-end systems.

2014-2016 and 2017-2019:
Was invited and joined Energous Corporation, a Silicon Valley high-tech start-up based in San Jose, CA which is pioneering wireless charging for IoT and other commercial and industrial applications. The first 2 years joined as a full-time consultant at the company's early stage, directing all aspects of the company's antenna development. The company went public and was listed in NASDAQ in 2014. During the second tenure, again after invitation, joined the company as a Senior Principal Scientist.

6/03-7/04:
Joined Ethertronics Corporation, a high-tech start-up based in San Diego, as Director of Advanced R&D. Ethertronics focused on producing world's best antennas for the emerging multi-band mobile phone markets. The company was acquired in 2018 by Kyocera-AVX, a wholly owned subsidiary of the Kyocera group.

11/00-6/2001:
Co-founding Scientist of Kimalink Corporation, a high-tech start-up based in Los Angeles, CA and targeting development of the world's best on-chip integrated passives, in particular high-Q inductors, transformers and filters, for applications in the chipsets driving the nascent markets of Bluetooth and WiFi. The company was acquired in 2001, seven months after its founding, by Broadcom Corporation, currently the world's third largest fabless semiconductor company (by revenue).

PRESENTATIONS

♦ Fifty Engineering presentations in European Conferences, IEEE Antennas and Propagation Society International Conferences, IEEE Microwave Theory and Techniques International Conferences, Silicon Valley Communications Design Conferences, International Summer Schools, Lawrence Livermore National Laboratory, Lucent Technologies, Hughes, Boeing, Broadcom, Sony/Ericsson.

♦ Forty presentations in Physics International Symposia, US National Laboratories (FERMILAB, Brookhaven, SLAC, Argonne), European Laboratories (CERN, ITP Marseilles) and US universities (Yale, University of Michigan, University of California Berkeley, University of California Los Angeles, University of California San Diego, University of California Santa Barbara, University of Colorado, University of Illinois Urbana-Champaign, Pennsylvania State University).

PATENTS

1. U.S. Patent 10,490,346, November 26 2019, "Antenna structures having planar inverted F antenna that is surrounded by artificial magnetic conductor cells", H. Contopanagos.
2. U.S. Patent 10,381,880, August 13 2019, "Integrated antenna structure arrays for wireless power transmission", M. Leabman and H. Contopanagos.
3. U.S. Patent 10,218,227, February 26 2019, "Compact PIFA antenna", M. Leabman and H. Contopanagos.
4. U.S. Patent 10,205,239, February 12 2019, "Compact PIFA antenna", H. Contopanagos and M. Leabman.
5. U.S. Patent 10,177,594, January 8 2019, "Radiating metamaterial antenna for wireless charging", H. Contopanagos.
6. U.S. Patent 10,116,143, October 30 2018, "Integrated antenna arrays for wireless power transmission", M. Leabman and H. Contopanagos.
7. U.S. Patent 10,068,703, September 4 2018, "Integrated miniature PIFA with artificial magnetic conductor metamaterials", H. Contopanagos.
8. U.S. Patent 9,899,744, February 20 2018, "Antenna for wireless charging systems", H. Contopanagos and M. Leabman.
9. U.S. Patent 9,871,301, January 16 2018, "Integrated miniature PIFA with artificial magnetic conductor metamaterials", H. Contopanagos.
10. U.S. Patent 9,853,485, December 26 2017, "Antenna for wireless charging systems", H. Contopanagos.
11. U.S. Patent 7,555,278, June 30 2009, "Unconditionally stable filter", H. Contopanagos, S. Kyriazidou, J. Rael and R. Rofougaran.
12. U.S. Patent 7,236,080, June 26 2007, "On-chip high Q inductor", S. Kyriazidou, H. Contopanagos and R. Rofougaran.
13. U.S. Patent 7,116,202, October 3 2006, "Inductor circuit with a magnetic interface", N. Alexopoulos, H. Contopanagos and S. Kyriazidou.
14. U.S. Patent 7,109,947, September 19 2006, "Methods of generating a magnetic interface", N. Alexopoulos, H. Contopanagos and S. Kyriazidou.
15. U.S Patent 7,032,292, April 25 2006, "Methods of manufacturing high-Q on-chip inductor", S. Kyriazidou, H. Contopanagos and R. Rofougaran.
16. U.S. Patent 6,979,608, December 27 2005, "Method of manufacturing an on-chip inductor having improved quality factor", H. Contopanagos, C. Komninakis and S. Kyriazidou.
17. U.S. Patent 6,944,435, September 13 2005, "Unconditionally stable on-chip filter and applications thereof", H. Contopanagos, S. Kyriazidou, J. Rael and R. Rofougaran.

18. U.S. Patent 6,937,128, August 30 2005, "On-chip inductor having a square geometry and high Q factor and method of manufacture thereof", H. Contopanagos and S. Kyriazidou.
19. U.S. Patent 6,906,682, June 14 2005, "Apparatus for generating a magnetic interface and applications of the same", N. Alexopoulos, S. Kyriazidou and H. Contopanagos.
20. U.S. Patent 6,853,350, February 8 2005, "Antenna with a Magnetic Interface", N. Alexopoulos, S. Kyriazidou and H. Contopanagos.
21. U.S. Patent 6,847,925, January 25 2005, "Method and apparatus for modeling three-dimensional electromagnetic scattering from arbitrarily shaped three-dimensional objects", J. Ottusch, H. Contopanagos, J. Visher, V. Rokhlin and S. Wandzura.
22. U.S. Patent 6,812,544, November 2 2004, "Integrated circuit having oversized components", H. Contopanagos and C. Komninakis.
23. U.S. Patent 6,809,623, October 26 2004, "High Q on-chip inductor", S. Kyriazidou, H. Contopanagos and R. Rofougaran.
24. U.S. Patent 6,709,977, March 23 2004, "Integrated circuit having oversized components and method of manufacture thereof", H. Contopanagos and C. Komninakis.
25. World Patent WO/2003/030298, 10 April 2003 "Apparatus for generating a magnetic interface and applications of the same", N. Alexopoulos, H. Contopanagos and S. Kyriazidou.
26. World Patent WO/2001/098953, 27 December 2001 "Method and apparatus for modeling three-dimensional electromagnetic scattering from arbitrarily shaped three-dimensional objects", J. Ottusch, H. Contopanagos, J. Visher, V. Rokhlin and S. Wandzura.
27. U.S. Pat. App. 20190393729, Pub. Date December 26, 2019, "Power wave transmission techniques to focus wirelessly delivered power at a receiving device ", H. Contopanagos, S. Kyriazidou, A. Papio-Toda, S. Sengupta and F. Farzami.
28. European Pat. App. EP 3166205, Pub. Date May 10 2017 "Antenna for Wireless Charging systems", H. Contopanagos.

LIST OF PUBLICATIONS

Publications in Refereed Journals

1. "An electrically small 3-d folded grounded loop antenna for omnidirectional connectivity", H. Contopanagos, Progress in Electromagnetics Research C, Vol. 107 (2021), pp. 245-258.
2. "A broadband polarized artificial conductor metasurface", H. Contopanagos, Jour. Electrom. Waves and Apps. Vol. 34, No. 14 (July 2020), pp. 1823-1841.
3. "3D package-integrated artificial magnetic conductor antenna arrays for 60 GHz transceivers", C. Kyriazidou, H. Contopanagos, S. Yoon, A. Papio-Toda, F. De Flaviis, J. Castaneda and N.G. Alexopoulos, Jour. Electrom. Waves and Apps. Vol. 30, No. 18 (Dec. 2016), pp. 2365-2389.
4. "On the projection of curved AMC reflectors from physically planar surfaces", H. Contopanagos, C. Kyriazidou, A. Papio-Toda, F. De Flaviis and N. Alexopoulos, IEEE Trans. Antennas and Propagation, Vol. 63, No. 2 (February 2015), pp. 646-658.
5. "A PCB-integrated multi-slotted PIFA for 2.5 GHz autonomous RFID or Bluetooth applications", H. Contopanagos, P. Broutas, A. Papio Toda, F. De Flaviis and S. Chatzandroulis, Journ. Electrom. Waves and Apps.,Vol. 27, Issue 6 (April 2013), pp. 736-749.
6. "Induced resonant electromagnetic transmission in Almost-shorted Dual Screens", H. Contopanagos, Journ. Opt. Soc. Am. B, Vol. 30, Issue 4 (April 2013), pp. 874-883.
7. "Embedded multi-slotted PIFAs for remotely powered passive UHF RFID tags", H. Contopanagos, P. Broutas and S. Chatzandroulis, Microw. & Opt. Tech. Lett., Vol. 54, No. 10 (October 2012), pp. 2379-2383.
8. "A RF power harvester with integrated antenna capable of operating near ground planes", P.

Broutas, H. Contopanagos, D. Tsoukalas and S. Chatzandroulis, Sensors and Actuators A, Vol. 186, (October 2012), pp. 284-288.

9. "Space-Frequency projection of Planar AMCs on integrated antennas for 60 GHz radios", C. Kyriazidou, H. Contopanagos and N. Alexopoulos, IEEE Trans. Antennas and Propagation, Vol. 60, No. 4 (April 2012), pp. 1899-1909.
10. "A low-power RF harvester for a smart passive sensor tag with integrated antenna" P. Broutas, H. Contopanagos, E. Kyriakis-Bitzaros, D. Tsoukalas and S. Chatzandroulis, Sensors and Actuators A, Vol. 176 (April 2012), pp. 34-45.
11. "Fully integrated monolithic optoelectronic transducer for real-time protein and DNA detection: The NEMOSLAB approach", K. Misiakos, P.S. Petrou, S.E. Kakabakos, D. Yannoukakos, H. Contopanagos, T. Knoll, T. Velten, M. DeFazio, L. Schiavo, M. Passamano, D. Stamou and G. Nounesis, Biosensors & Bioelectronics, Vol. 26, No. 4 (April 2010), pp. 1528-1535.
12. "Optimized Porous Si Microplate Technology for On-Chip local RF isolation", F. Zacharatos, H. Contopanagos, and A.G. Nassiopoulou, IEEE Trans. Electron Devices, Vol. 56, No. 11 (Nov. 2009), pp. 2733-2738.
13. "A Monolithic Photonic Microcantilever Device for in-Situ Monitoring of Volatile Compounds", K. Misiakos, I. Raptis, A. Gerardino, H. Contopanagos, and M. Kitsara, Lab Chip, Vol. 9 (Sep. 2009), pp. 1261 - 1266.
14. "Broadband electrical characterization of macroporous silicon at microwave frequencies", H. Contopanagos, D. Pagonis and A. G. Nassiopoulou, Phys. Stat. Sol. (a) 205, No. 11 (Nov. 2008), pp. 2548-2551.
15. "RF characterization and isolation properties of mesoporous Si by on-chip coplanar waveguide measurements", H. Contopanagos, F. Zacharatos and A. G. Nassiopoulou, Solid-State Electronics Vol. 52, No 11 (Nov. 2008), pp. 1730-1734.
16. "Integrated inductors on porous silicon", H. Contopanagos and A. Nassiopoulou, Phys. Stat. Sol. (a) 204, No. 5 (May 2007), pp. 1454-58.
17. "Effective parameters for metamorphic materials and metamaterials through a resonant inverse scattering approach", N. Alexopoulos, C. Kyriazidou and H. Contopanagos, IEEE Trans. Microwave Theory Tech. Vol. 55, No 2 (Feb. 2007), pp. 254-267.
18. "Metamorphic Materials: Bulk electromagnetic transitions realized in electronically reconfigurable composite media", C. Kyriazidou, H. Contopanagos and N. Alexopoulos, Journ. Opt. Soc. Am. A Vol. 23, No. 11 (Nov. 2006), pp. 2961-2968.
19. "Design and simulation of Integrated inductors on porous Silicon in CMOS-compatible processes", H. Contopanagos and A. Nassiopoulou, Solid State Electr., Vol. 50, No. 7-8 (Jul.-Aug. 2006), pp. 1283-1290.
20. "Electromagnetic design methods in systems-on-chip: Integrated filters for wireless CMOS RFICs", H. Contopanagos, Journal of Physics, Vol.10 (2005), pp. 337-342.
21. "Well-conditioned Boundary Integral Equations for Three-Dimensional Electromagnetic Scattering", H. Contopanagos, B. Dembart, M. Epton, J. Ottusch, V. Rokhlin, J. Visher and S. Wandzura, IEEE Trans. Antennas and Propagation, Vol. 50, No. 12 (Dec. 2002), pp. 1824-1830.
22. "Artificial versus Natural Crystals: Effective Wave Impedance of Photonic Band Gap Materials", C. Kyriazidou, H. Contopanagos, W. Merrill and N. Alexopoulos, IEEE Trans. Antennas and Propagation, Vol. 48, No. 1 (Jan. 2000), pp. 95-106.
23. "Monolithic Waveguide Filters using Printed Photonic Band Gap Materials", C. Kyriazidou, H. Contopanagos and N. Alexopoulos, IEEE Trans. Microwave Theory Tech., Vol. 49, No. 2 (Feb. 2001), pp. 297-307.
24. "Electromagnetic Scattering from a PBG Material Excited by an Electric Line Source", W.M. Merrill, C.A. Kyriazidou, H.F. Contopanagos and N.G. Alexopoulos, IEEE Trans. Microwave Theory Tech., Vol. 47, No. 11 (Nov. 1999), pp. 2105-2114.

25. “Electromagnetic properties of Periodic Arrays of Ultra-Thin Metallic Films from DC to Ultraviolet Frequencies”, H. Contopanagos, E. Yablonovitch and N. Alexopoulos, Journ. Opt. Soc. Am. A, Vol. 16, No. 9 (Sep. 1999), pp. 2294-2306.
26. “Effective Response Functions for Photonic Band Gap Materials”, H. Contopanagos, C. Kyriazidou, W. Merrill and N. Alexopoulos, Journ. Opt. Soc. Am. A, Vol. 16, No. 7 (July. 1999), pp. 1682-1699.
27. “Thin Frequency Selective Lattices integrated in Novel Compact MIC, MMIC and PCA Architectures”, H. Contopanagos, L. Zhang and N. Alexopoulos, IEEE Trans. Microwave Theory Tech., Vol. 46, No. 11 (Nov. 1998), pp. 1936-1948.
28. “High-Q Radio Frequency Structures using One-Dimensionally Periodic Metallic Films”, H. Contopanagos, N. Alexopoulos and E. Yablonovitch, IEEE Trans. Microwave Theory Tech., Vol. 46, No. 9 (Sep. 1998), pp. 1310-1312.
29. “Threshold Resummation of the Total Cross-Section for Heavy Quark Production in Hadronic Collisions”, E. Berger and H. Contopanagos, Phys. Rev D57 (1998) pp. 253-264.
30. “Sudakov Factorization and Resummation”, H. Contopanagos, E. Laenen and G. Sterman, Nucl. Phys. B484 (1997) pp. 303-330.
31. “Perturbative Resummed Series for Top-Quark Production in Hadron Reactions”, E. Berger and H. Contopanagos, Phys. Rev. D54 (1996) pp. 3085-3113.
32. “Reply to `Scattering of very light charged particles' ”, H. Contopanagos and M. Einhorn, Phys. Rev. D54 (1996) pp.2978-2979.
33. “Perturbative Gluon Resummation of the Top-Quark Production Cross Section”, E.Berger and H. Contopanagos, Phys. Lett. B361 (1995) pp. 115-120.
34. “The Dilepton-Production Cross-Section in Principal Value Resummation”, L. Alvero and H. Contopanagos, Nucl. Phys. B456 (1995) pp. 497-530.
35. “Non-Leading Logarithms in Principal Value Resummation”, L. Alvero and H. Contopanagos, Nucl.Phys. B436 (1995) pp. 184-212.
36. “Principal Value Resummation”, H. Contopanagos and G. Sterman Nucl. Phys. B419 (1994) pp. 77-104.
37. “Normalization of the Drell-Yan cross section in QCD”, H. Contopanagos and G. Sterman, Nucl. Phys. B400 (1993) pp. 211-224.
38. “Coherent-State Parametrization of the QCD Long Distance Dynamics”, H. Contopanagos, Nucl. Phys. B397 (1993) pp. 539-563.
39. “Physical Consequences of Mass Singularities”, H. Contopanagos and M. Einhorn, Phys. Lett. B277 (1992) pp. 345-352.
40. “Radiative Background to the Search for Right-Handed Charged Currents”, H. Contopanagos and M. Einhorn, Nucl. Phys. B377 (1992) pp. 20-30.
41. “Pseudoanomalies in the Interactions of Massless Particles”, H. Contopanagos and M. Einhorn, Phys. Rev. D45 (1992) pp. 1322-1331.
42. “Interpretation of the Asymptotic S-Matrix for Massless Particles”, H. Contopanagos and M. Einhorn, Phys. Rev. D45 (1992) pp. 1291-1321.
43. “Smooth Massless Limit of QED”, H. Contopanagos, Nucl.Phys. B343 (1990) pp. 571-596.

Book Chapters

1. “Theory and Design of Metamorphic Materials”, C. Kyriazidou, H. Contopanagos and N. Alexopoulos, Chapter 20 in *Metamaterials Handbook, Vol. I Theory and Phenomena of Metamaterials, Part III,* pp. 20.1-20.18, Filippo Capolino (Editor) CRC Press, Taylor & Francis, Boca Raton, FL. (Oct. 2009), 1736 pages.

Ph.D. Thesis

"The Asymptotic S-Matrix in Massless Gauge Theories", H. Contopanagos, Ph.D. Thesis, University of Michigan (1991), Ann Arbor, UMI-91-35576, 200 pages.

Publications in Conference Proceedings

1. "Planar Spiral AMCs integrated on 60 GHz Antennas", H. Contopanagos, C. Kyriazidou, F. De Flaviis and N. Alexopoulos, IEEE Antennas and Propagation Society Intl. Symposium Digest, Chicago, IL, USA, 8-14 July 2012, pp.1-2.
2. "A 430 MHz RF power harvester with integrated antenna", P. Broutas, H. Contopanagos, D. Tsoukalas and S. Chadzandroulis, Eurosensors 2011, Athens, Greece, (4-11 Sept. 2011), Procedia Engineering, Vol. 25, pp. 191-194, 2011.
3. "Ultra-miniaturized monolithically integrated polymer coated Si optoelectronic cantilevers for gas sensing applications", K. Misiakos et al., Proceedings of IEEE Sensors 2009, (25-29 Oct. 2009), pp. 429-432.
4. "On-chip RF-shielding by mesoporous Si microplate measured through an integrated coplanar waveguide", H. Contopanagos, F. Zacharatos and A. G. Nassiopoulou, Materials of the 6th International Conf. on Porous Semiconductors – Science and Technology, Mallorca, Spain, pp. 80-81 (10-14 March 2008).
5. "Effective description and power balance of Metamaterials", C. Kyriazidou, H. Contopanagos and N. Alexopoulos, 23rd Annual Review of Progress in Applied Computational Electromagnetics, 19-23 March 2007, Verona, Italy, published in ACES 2007 Conference Proceedings, pp. 260-264.
6. "Integrated inductors on porous silicon", H. Contopanagos and A. Nassiopoulou, Proc. of the 5th Intl. Conf. on Porous Semiconductors – Science and Technology 12-17 March 2006, Sitges-Barcelona, Spain, pp. 122-123.
7. "Metamorphic Electromagnetic Media", C. Kyriazidou, H. Contopanagos and N. Alexopoulos, Proc. of the 9th Intl. Conf. On Electromagnetics in Adv. Applications ICEAA 2005 (September 2005), Torino, Italy, pp. 965-968.
8. "Wheeler's law and related issues in Integrated Antennas", H. Contopanagos, S. Rowson and L. Desclos, published in 2004 IEEE Antennas and Propagation Society Intl. Symposium Digest (20-25 June 2004), Vol. 2, pp. 2059-2062.
9. "Analytic Preconditioner for the EFIE", H. Contopanagos, J. Ottusch, V. Rokhlin, J. Visher and S. Wandzura, Proc. of the 17th Conference on Progress in Applied Computational Electromagnetics, 15-19 March 2001, Monterey, CA, p. 186.
10. "A Waveguide Network modal approach for Electromagnetic Propagation in Urban High-rise Environments", H. Contopanagos, Hughes Research Lab publication TICR # 00-200 (July 2000).
11. "High-Order Time-Domain Wave Propagation Algorithms", H. Contopanagos and S. Wandzura", PIERS 2000 Progress in Electromagnetics Research Symp., Cambridge, MA, 5-14 July 2000.
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