

2015 European Radar Conference (EuRAD 2015)

**Paris, France
9-11 September 2015**



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EuRAD02: Advanced Synthetic Aperture Radar Processing

Chair: Fabio Rocca, Politecnico di Milano

Co-Chair: Eric Pottier, University of Rennes 1

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¹DLR, Germany; ²University of Kent, UK; ³Silicon Radar, Germany; ⁴Università della Calabria, Italy; ⁵IHP, Germany; ⁶ISIS, The Netherlands; ⁷Evatronix, Poland
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¹Ohio State University, USA; ²Jet Propulsion Laboratory, USA
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¹FDRA, Finland; ²Tampere University of Technology, Finland

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Chair: Stefano Tebaldini, Politecnico Di Milano

Co-Chair: Xiao Xiang Zhu, Technische Universität München

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Chair: Barbaresco Frederic, Thales Air Systems

Co-Chair: Alfonso Farina, Selex ES

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Chair: Krzysztof Kulpa, Warsaw University of Technology

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¹KIT, Germany; ²Università di Bologna, Italy
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¹National Aviation University, Ukraine; ²Technische Universiteit Delft, The Netherlands
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Chair: Pierfrancesco Lombardo, Universit'a di Roma "La Sapienza"

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¹Robert Bosch, Germany; ²Universität Ulm, Germany

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Co-Chair: Philippe Eudeline, Thales Air Systems

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¹CNIT, Italy; ²Elettronica, Italy

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Chair: Mateo Burgos Garcia, Universidad Politécnica de Madrid

Co-Chair: Maria-Pilar Jarabo Amores, Universidad de Alcalá de Henares

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Chair: Cédric Le Bastard, Cerema-IETR, Université de Nantes

Co-Chair: Lara Pajewski, Università di Roma Tre

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¹Alyotech, France; ²CEREMA, France; ³IETR, France
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¹ONERA, France; ²LEAT, France; ³L3i, France; ⁴TRONICO, France

EuRAD15: New Radar Architecture and Enabling Technologies

Chair: *Andreas Reigber, DLR*

Co-Chair: *Hermann Rohling, TUH*

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¹Scuola Superiore Sant'Anna, Italy; ²CNIT, Italy
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¹University of Oklahoma, USA; ²NCAR, USA; ³Kyoto University, Japan
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¹University of Tokyo, Japan; ²JAXA, Japan

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Chair: *Mateo Burgos Garcia, Universidad Politécnica de Madrid*

Co-Chair: *Wolfgang Menzel, Universität Ulm*

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¹RMIT University, Australia; ²University of Melbourne, Australia
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¹Autoliv, USA; ²Autoliv, Germany
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¹Universidad Politécnica de Madrid, Spain; ²Alfa Imaging, Spain; ³Sensowave, Spain
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¹KIT, Germany; ²Silicon Radar, Germany; ³Universität Paderborn, Germany

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Chair: Laurent Le Coq, Université de Rennes

Co-Chair: Sergey Pivnenko, Technical University of Denmark

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¹Universidad Politécnica de Madrid, Spain; ²Microwave Vision Italy, Italy
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¹TICRA, Denmark; ²Technical University of Denmark, Denmark

EuMC/EuRAD01: Novel Microwave Technologies for Antennas

Chair: Tan-Phu Vuong, University of Grenoble

Co-Chair: Christian Waldschmidt, Universität Ulm

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¹Robert Bosch, Germany; ²Universität Ulm, Germany
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¹IIT Bombay, India; ²IIT Jabalpur, India

EuMC/EuRAD02 : UWB Antenna Systems

Chair: Cyrille Menudier, University of Limoges

Co-Chair: Michele Lalande, University of Limoges

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¹XLIM, France; ²CISTEME, France; ³SIAME, France; ⁴DGA, France
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¹St. Petersburg Electrotechnical University, Russia; ²Heriot-Watt University, UK; ³ITMO University, Russia

EuMC/EuRAD03 : Antenna System Assessment for Radar and Communication Applications

Chair: Jean-Yves Dauvignac, University of Nice Sophia Antipolis

Co-Chair: Alexander Yarovoy, Delft University of Technology

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¹XLIM, France; ²CISTEME, France
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Marc Biancheri-Astier³*
¹ESYCOM, France; ²GeePs, France; ³GEOPS, France

EuMC/EuRAD04: Feeds, Wideband and Multi Band Antennas

Chair: Alexandru Takacs, University of Toulouse

Co-Chair: Jean-Yves Dauvignac, University of Nice

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Chandra Shekhar Prasad, Animesh Biswas, IIT Kanpur, India

EuMC/EuRAD05: Printed Antennas

Chair: Raphaël Gillard, INSA Rennes

Co-Chair: Milan Polivka, Czech Technical University in Prague

Venue: Room 253, Time 16:10 – 17:50, Wednesday 9th September 2015

- 373 **An Active Three-Dimensional GPS Patch Antenna Using MID-Technology**
A. Friedrich¹, L. Berkelmann¹, T. Martinelli¹, B. Geck¹, O. Klemp², I. Kriebitzsch²
¹Leibniz Universität Hannover, Germany; ²BMW Group, Germany
- 377 **Orbital Angular Momentum Mode Multiplexing with Half-Mode Substrate Integrated Waveguide Antenna**
Yiling Chen, Shilie Zheng, Hao Chi, Xiaofeng Jin, Xianmin Zhang, Zhejiang University, China
- 381 **Circularly Polarized Isoflux Compact X Band Antenna for Nano-Satellites Applications**
J. Fouany¹, M. Thevenot¹, Eric Arnaud¹, F. Torres¹, T. Monédière¹, N. Adnet², R. Manrique², L. Duchesne², J.M. Baracco², K. Elis³
¹XLIM, France; ²SATIMO, France; ³CNES, France
- 385 **Multiband Printed Antenna Composed of an Array of Split Ring Resonators**
Achmad Munir, Jumail Soba, Institut Teknologi Bandung, Indonesia
- 389 **Dual Orthogonal CPW Feed Single Element UWB Antenna with Polarization Diversity**
G. Shrikanth Reddy, Kaustubh Chhabilwad, Shilpa Kharche, Pragati Patel, Jayanta Mukherjee, IIT Bombay, India

EuMC/EuRAD06: Array Antennas — Design & Concepts

Chair: Peter Gardner, University of Birmingham

Co-Chair: Ioan E. Lager, Delft University of Technology

Venue: Maillot, Time 08:30 – 10:10, Thursday 10th September 2015

- 393 **An Implemented Non-Focal Rotman Lens**
Mojtaba Rajabalian, Bijan Zakeri, Babol Noshirvani University of Technology, Iran
- 397 **A Study of Multi-Phase Vector-Sum Phase Shifters for Phased Array**
Atsushi Honda, Toshihiro Shimura, Yoji Ohashi, Fujitsu Laboratories, Japan
- 401 **Analysis and Design of a Slotted Waveguide Antenna Array Using Hollow Substrate Integrated Waveguide**
Lukai Jin, Razak M. Lee, Ian D. Robertson, University of Leeds, UK
- 405 **Design of a Scalable Phased Array Antenna with a Simplified Architecture**
Fatemeh Akbar, Amir Mortazawi, University of Michigan, USA
- 409 **Design Considerations on a Sparse Array Antenna for Ka-Band Spaceborne SAR Applications**
S. Jacobs¹, D. Bekers¹, S. Monni¹, M. Otten¹, W. van Rossum¹, G. Gerini¹, C. Germani², D. Fortini², G. Toso³
¹TNO, The Netherlands; ²Thales Alenia Space, Italy; ³ESA, The Netherlands

EuMC/EuRAD07: Antenna Arrays for Different Applications

Chair: Jean-Marc Goutoule, Airbus Defence and Space

Co-Chair: Alexander Yarovoy, Delft University of Technology

Venue: Room 253, Time 08:30 – 10:10, Thursday 10th September 2015

- 413 **An Agile Electronically Scanned EBG Matrix Antenna for Monitoring Target Activity**
Hussein Abou Taam¹, Ali Sibli¹, Georges Zakka El Nashef¹, Bernard Jecko¹, Eric Arnaud¹, Nicolas Chevalier¹, Mohamed Rammal²
¹XLIM, France; ²Lebanese University, Lebanon
- 417 **Comparison of Virtual Arrays for MIMO Radar Applications Based on Hexagonal Configurations**
C. Dahl, Ilona Rolfes, M. Vogt, Ruhr-Universität Bochum, Germany
- 421 **Wideband Antenna Array for Real-Time Data and Video Transmission**
Jean-Marie Floch, Bilal El Jaafari, Ahmed El Sayed Ahmed, IETR, France
- 425 **Multi-Beam Tapered Slot Antenna Array Using Substrate Integrated Waveguide Rotman Lens**
Javad Pourahmadazar, Tayeb A. Denidni, INRS-EMT, Canada
- 429 **Wide Angle Scanning Reconfigurable Beam Steering Antenna**
T. Sabapathy¹, M. Jusoh¹, R.B. Ahmad¹, M.R. Kamarudin²
¹Universiti Malaysia Perlis, Malaysia; ²Universiti Teknologi Malaysia, Malaysia

EuMC/EuRAD08: Array Antennas — Implementation

Chair: *Ioan E. Lager, Delft University of Technology*

Co-Chair: *Peter Gardner, University of Birmingham*

Venue: *Maillot, Time 10:50 – 12:30, Thursday 10th September 2015*

- 433 **Prototype of 21-GHz Band Beam Forming Network for Array-Fed Imaging Reflector Antenna**
Masafumi Nagasaka, Susumu Nakazawa, Masashi Kamei, Shoji Tanaka, Tomohiro Saito, NHK, Japan
- 437 **Compact Scan-Phase Antenna Diversity System for High Driving Speeds**
S. Senega, A. Nassar, Stefan Lindenmeier, Universität der Bundeswehr München, Germany
- 441 **Implementation of the Ubiquitous Radar Concept with a Conformal Array**
P. Carta¹, G. Galati¹, E.G. Piracci¹, F. Madaia², R. Ronconi²
¹Università di Roma “Tor Vergata”, Italy; ²Fincantieri, Italy
- 445 **Analog Beamforming Network for Ka Band Satellite on the Move Terminal with Phase Shifting Technique Based on I/Q Mixer**
Saverio Alessandro¹, Maria Concetta De Bilio¹, Salvatore Coco², Gaspare Bavetta², Ignazio Pomona³, Antonio Laudani⁴
¹Selex ES, Italy; ²Università di Catania, Italy; ³RF System Engineer Consultant, Italy; ⁴Università di Roma Tre, Italy
- 449 **Compact Ku-Band GaAs Multifunction Chip for SATCOM Phased Arrays**
Dong-Hwan Shin¹, Jin-Cheol Jeong¹, Seong-Mo Moon¹, In-Bok Yom¹, Dong-Wook Kim²
¹ETRI, Korea; ²Chungnam National University, Korea

EuMC/EuRAD09: Antenna Arrays and Beam Scanning

Chair: *Olivier Lafond, University of Rennes 1*

Co-Chair: *Dirk Heberling, Aachen University*

Venue: *Room 253, Time 10:50 – 12:30, Thursday 10th September 2015*

- 453 **Pulsed-Field Array Performance: A TD Analysis**
Ioan E. Lager, Technische Universiteit Delft, The Netherlands
- 457 **Waveguide-Type Discrete Beam-Scan Antenna with Switching Diodes**
Hiroshi Kubo, Tsunayuki Yamamoto, Masayuki Takamatsu, Atsushi Sanada, Yamaguchi University, Japan
- 461 **Linear Dual-Band Phased Arrays with Wide-Angle Scanning Capability**
S.E. Valavan, D. Tran, A.G. Yarovoy, A.G. Roederer, Technische Universiteit Delft, The Netherlands
- 465 **Antenna for 3D Radar Demonstrator**
Vadim Závodný, Petr Kopecký, Eldis Pardubice, Czech Republic
- 469 **Design of a Waveguide Slot Array Antenna for Monopulse Tracking Application in Millimeter Wave**
Wentao Zhang, Fengyun Cui, Qiang Wang, Xiaoyang He, Chuanfei She, Yingyi He, CAEP, China

EuMC/EuRAD10: Antennas for Ka-Band Applications

Chair: Arne Jacob, Technical University of Hamburg

Co-Chair: Erwan Fourn, INSA Rennes

Venue: Room 253, Time 13:50 – 15:30, Thursday 10th September 2015

- 473 **A Dual-Frequency and Dual-Polarized Patch Antenna at Ka-Band**
Benjamin Rohrdantz, Thomas Jaschke, Frauke K.H. Gellersen, Arne F. Jacob, Technische Universität Hamburg-Harburg, Germany
- 477 **Design and Investigation of Meshed Patch Antennas for Applications at 24GHz**
Q.H. Dao, R. Braun, B. Geck, Leibniz Universität Hannover, Germany
- 481 **SIW Multilayer Rotman Lens Antenna in the 24-GHz Band**
Karim Tekkouk, Mauro Ettore, Ronan Sauleau, IETR, France
- 485 **A Wideband Planar Array Antenna for Ka-Band Wireless Communication Applications**
Jie Wu, Yu Jian Cheng, Yong Fan, UESTC, China
- 489 **Conformal K Band Array Performance Prediction Based on Improved Element Modeling**
G. Nelson¹, G.R. Branner¹, M. Chun¹, B.P. Kumar²
¹University of California at Davis, USA; ²California State University at Sacramento, USA

EuRAD/EuMCP01: EuRAD/EuMC Poster01 Session

Chair: Michèle Lalande, University of Limoges

Co-Chair: Laurent Ferro-Famil, University of Rennes 1

Venue: Hall Ternes – Level 1, Time 12:30 – 14:10, Thursday 10th September 2015

- 493 **A Rotating Antenna Ground-Based SAR**
Massimiliano Pieraccini, Nicola Agostini, Federico Papi, Silvestro Rocchio, Università di Firenze, Italy
- 497 **A Real-Time Multiple Target Detecting Scheme Based on Microwave Metamaterials**
Chung-Tse Michael Wu, Wayne State University, USA
- 501 **Phase Noise Analysis in FMCW Radar Systems**
Kashif Siddiq¹, Robert J. Watson¹, S.R. Pennock¹, Philip Avery², Richard Poulton², Ben Dakin-Norris²
¹University of Bath, UK; ²Navtech Radar, UK
- 505 **Performance Evaluation of Passive Secondary Surveillance Radar for Small Aircraft Surveillance**
Takuya Otsuyama¹, Junichi Honda¹, Kakuichi Shiomi¹, Gaku Minorikawa², Yusuke Hamanaka²
¹ENRI, Japan; ²Hosei University, Japan
- 509 **FMCW Ramp Non-Linearity Effects and Measurement Technique for Cooperative Radar**
Andreas Frischen¹, Juergen Hasch¹, Christian Waldschmidt²
¹Robert Bosch, Germany; ²Universität Ulm, Germany
- 513 **Zero-IF Radar Signal Processing**
Stefano Turso, Thomas Bertuch, Fraunhofer FHR, Germany

- 517 **cuDeformer — Software for Reversing Radar Signal Processing, Based on CUDA Technology**
Jacek Gambrych, Warsaw University of Technology, Poland
- 521 **Analysis of Circular Polarization of the Quadrifilar Helix Antenna in the Presence of Ground Plane for LEO Satellites**
M. Ahmad¹, M. Amin², A.A. Khan¹, M.T. Azim³, Mohammad A. Alim⁴
¹CIIT, Pakistan; ²IST, Pakistan; ³SRDC, Pakistan; ⁴University of Manchester, UK
- 525 **Comparison Study of Scalar and Vector Calibrations for Wideband Modulation Signals**
Shuw-Guann Lin¹, Da-Chiang Chang¹, Ying-Zong Juang¹, Hwann-Kaeo Chiou²
¹NARLabs, Taiwan; ²National Central University, Taiwan
- 529 **A Low-Cost IEEE802.11ad Wireless Network Appliance Test System with Mixed Domain Oscilloscope and Down Converter**
Kohei Fujiwara¹, Takeshi Kobayashi¹, Junichi Ukita², Yoshikazu Honjo²
¹TIRI, Japan; ²Candox Systems, Japan
- 533 **Method of Multi-Channel Calibration for Digital Array Radar**
Weixing Li, Jianzhi Lin, Weihua Wang, Yasen Wang, Zengping Chen, NUDT, China
- 537 **Wideband Vivaldi Antenna Array with Mechanical Support and Protection Radome for Land-Mine Detection Radar**
N.T. Nguyen¹, G. Clementi¹, C. Migliaccio¹, N. Fortino¹, J.-Y. Dauvignac¹, J. Willebois², C. Chekroun²
¹LEAT, France; ²BOWEN ERTE, France

EuRAD/EuMCPPoster02: EuRAD/EuMC Poster02 Session

Chair: Laurent Ferro-Famil, University of Rennes 1

Co-Chair: Michèle Lalande, University of Limoges

Venue: Hall Ternes — Level 1, Time 12:30 - 14:10, Thursday 10th September 2015

- 541 **Statistical Properties of the Polarization Ratio for Radar Returns with Deterministic Polarized Targets in Clutter**
Bo Ren, Longfei Shi, Shunping Xiao, Guoyu Wang, Yuliang Chang, NUDT, China
- 545 **The Study of Microwave Scattering of Anisotropic Sea Surface with the Corrected Two-Scale Model**
Da-wei Song, She Shang, Xi Luo, CAST, China
- 548 **An Analytical Method to Compute Track Continuity Performance Measures**
Jeroen Wijnhout, Thales Nederland, The Netherlands
- 552 **Target Detection Using Space-Time Adaptive Processing (STAP) and a Multi-Band, Multi-Channel Software Defined Passive Radar**
Mubashir Alam, Khalid Jamil, Sami M. Alhumaidi, King Saud University, Saudi Arabia
- 556 **High-Performance Autofocusing for Light-Weight SAR Platforms**
Ievgen M. Gorovyi, Oleksandr O. Bezvesilnyi, Dmytro M. Vavriv, NASU, Ukraine
- 560 **Real Time Classification of Targets Using Waveforms in Resonance Scattering Region**
M. Alper Selver¹, E. Yeşim Zoral¹, Mustafa Seçmen²
¹Dokuz Eylül University, Turkey; ²Yaşar University, Turkey
- 564 **Integrated FFT Accelerator and Inline Bin-Rejection for Automotive FMCW Radar Signal Processing**
Dian T. Nugraha, Andre Roger, Romain Ygnace, Infineon Technologies, Germany

- 568 **Fast Analysis of Luneburg Lens Radiation by Green's Function Method**
Boris Panchenko¹, Sergey Shabunin¹, Dmitry Denisov²
¹Ural Federal University, Russia; ²Ural Technical Institute of Communications & Computer Sciences, Russia
- 572 **SNR in Active Receiving Antenna Used as an Element of Phased Antenna Array for GURT Radio Telescope**
Peter L. Tokarsky, Alexander A. Konovalenko, Igor S. Falkovich, Serge N. Yerin, NASU, Ukraine
- 576 **Omnidirectional Cylindrical Microstrip Antennas with Horizontally-Polarized Radiation**
Alexander Ye. Svezhentsev¹, Sen Yan², V. Volski², Guy A.E. Vandenbosch²
¹NASU, Ukraine; ²Katholieke Universiteit Leuven, Belgium
- 580 **Uniplanar Log-Periodic Antenna with a Perpendicular Plane Reflector Dedicated to a Radio Wave Camera System**
Faïcel Ouasli, Jean-Philippe Coupez, Patrice Pajusco, Christian Person, Lab-STICC, France
- 584 **Measurement of Point-of-Impact Based on Microwave PNCW Radar and Kalman Filtration**
Premysl Hudec¹, Filip Kozak¹, Petr Panek²
¹Czech Technical University in Prague, Czech Republic; ²CAS, Czech Republic