

Maxim Zhadobov

Directeur de Recherche CNRS, Institut d'Electronique et des Technologies du Numérique (IETR)
 Head of of Electromagnetic Waves in Complex Media (eWAVES) research group (42 members)
 Vice-president of the Commission K "Electromagnetics in Biology and Medicine" URSI France
 Council Member of the European Bioelectromagnetic Association (2017-2022)
 Associate Editor of IEEE Journal of Electromagnetics RF and Microwaves in Medicine and
 Biology

POSITIONS

- Since Oct. 2021 Directeur de Recherche / Senior Research Scientist.
National Center for Scientific Research (CNRS) / IETR, Rennes, France.
- Oct. 2011 – Sept. 2021 Chargé de recherche / Research Scientist. Principal Investigator in Biomedical Electromagnetics.
CNRS / IETR, Rennes, France.
- Jul. 2008 - Sept. 2011 Associate Researcher, *IETR, Rennes, France.*
 Coordinator of a large-scale research project funded by the National Research Agency (ANR).
- Apr. 2007 - Jun. 2008 Post-Doctoral Fellow.
Center for Biomedical Physics, Temple University, Philadelphia, USA.

DEGREES AND EDUCATION

- Jun. 2016 **HDR** ("Habilitation à Diriger des Recherches").
University of Rennes 1, France.
- Oct. 2003 - Nov. 2006 **PhD** in Biomedical Electromagnetics.
University of Rennes 1, France.

CONTRIBUTIONS AND IMPACT

Expertise Innovative biomedical applications of electromagnetic fields and associated technologies

- Multi-scale modelling and dosimetry. Multi-physics coupled problems applied to biomedical electromagnetics.
- Innovative wireless sensors and implants for biomedical applications. Body-centric wireless networks.
- Wireless power transfer for biomedical applications. Bio-inspired electromagnetic systems.

Research projects Coordinated 13 research projects [ANR, CNRS, ANSES, Labex CominLabs, Brittany Region, contracts with industry and SMEs] (portfolio of ≈ 4.5 M€), including a large-scale project (ANR Bio-CEM, 2009 – 2013, 1.4 M€). Contributed to 12 other projects [FP7, ESF, CNRS, ANR, ANSES, contracts with SMEs, etc.] including an EU FP7 Large Scale Integrating Project MiWaves (2014 – 2016, total cost 11 M€).

Publications 5 book chapters, > 80 articles, > 130 conference contributions (26 invited and 7 international awards [BioEM, BEMS, BioEM School, URSI]). Publication of his research group is among "Journal Top 100" of Nature Scientific Reports. Zhadobov et al. 2011 paper has been the most cited paper of Int. J. Microwave Wireless Technologies since 2016. Co-recipient of CST University Publication Award 2011 (with Chiba University, Japan).

Major achievements At the origin of several major and pioneering innovations in biomedical electromagnetics and body-centric wireless technologies including the first mm-wave tissue-equivalent phantoms, reflectivity based surface phantom concept, novel broadband multi-physics characterization technique for Debye-type materials, innovative mm-wave textile antennas for smart clothing, first mm-wave reverberation chamber and multi-physics tools for EMC testing.

SERVICES TO THE SCIENTIFIC COMMUNITY

- Associate Editor of IEEE Journal of Electromagnetics RF and Microwaves in Medicine and Biology [since 2020].
- Guest Editor of Special Issues in Applied Sciences [2020] and Sensors Journals [2022].
- Member of the Council of European Bioelectromagnetic Association [2017-2022].
- Vice-president of the Commission K "Electromagnetics in Biology and Medicine", URSI France [since 2019].
- Member of Technical Advisory Committee, URSI Commission K [since 2021].
- Expert at IEEE TC95 SC4 « Safety Levels, Human Exposure, 3 kHz-300 GHz » [since 2011].
- Member of AFNOR, CENELEC, and IEC TC 106 [since 2021].
- Senior member: IEEE (EMB, MTT, AP) [since 2014], URSI [since 2021].

SELECTED AWARDS

- CNRS Medal 2018
- Award for Excellence in Bioelectromagnetics, EBFA 2015
- Brittany Young Scientist Award 2010

CONTRIBUTION TO ORGANIZATION OF INTERNATIONAL SCIENTIFIC EVENTS

Strongly contributed to the organisation of major international conferences and workshops.

- [IEEE IMBioC 2022](#) [China]. Member of the organizing committee.
- [EUMW 2022](#) [Italy]. Co-organizer (with Micol Colella from Sapienza University) of the workshop “Dosimetry and microdosimetry applied to emerging wireless technologies: from human to cell level”.
- [URSI AT-AP-RASC 2022](#) [Spain]. Co-organizer of "New frontiers in RF dosimetry and exposure assessment" session.
- [BioEM2021](#) [Belgium], [BioEM2020](#) [UK], [BioEM2019](#) [France], Technical Program Committee (TPC) co-chair.
- [URSI GASS 2020](#) [Italy]. Co-organizer of “Human exposure at frequencies above 6 GHz” session.
- [EuMW 2019](#) [France]. Co-organizer (with Francesca Apollonio from Sapienza University) of the session “The grand challenge of microwaves in life science”.
- [BioEM 2018](#) [Slovenia] and [BioEM 2017](#) [China]. Member of the student awards committee.
- [EuCAP 2017](#), Paris, France. Invited chair of “Material measurements” session.
- [IEEE iWEM 2017](#) [UK] and [MobiHealth](#) [since 2015]. TPC member.
- [BodyNets 2016](#), Turin, Italy. Organizer of special track "Millimetre-wave body area networks".
- [IMWS-Bio 2014](#), London, UK. Committee chair “RF Antennas and body channel modelling” and organizer of “Wearable and textile RF antennas and sensors for healthcare and medical applications” session.

SUPERVISION ACTIVITIES AND ABILITY TO INSPIRE YOUNG SCIENTISTS

Supervised 16 PhD students and 10 Post-Doctoral Researchers.

The supervised PhD students and scientists continue their research in leading high-tech companies and institutions (*Caltech / JPL NASA [USA], EPFL [SH], Angstrom Lab [SE], IMEC UGhent [BE], Technicolor Research & Innovation [FR], Mitsubishi [FR], Thales Comm. & Security [FR], LivaNova [FR], etc.*).

The supervised PhD students received prestigious scientific awards including:

- First Best Student Paper Award, IEEE IMBioC 2022 (*A. Lojić Kapetanović*)
- Third Best Platform Presentation and Scientific Paper Award, BioEM 2018 (*R. Aminzadeh*)
- Best Paper Award URSI France 2017; Eiffel Scholarship of Excellence 2015 (*D. Nikolayev*)
- First Best Platform and Scientific Paper Award, BioEM 2015, USA (*A. Haas*)
- PhD Award of the Airbus Foundation 2014; PhD Award in Electronics of EEA 2013 (*N. Chahat*)
- IEEE Antennas and Propagation Society Research Award 2012 (*N. Chahat*)

TEACHING ACTIVITIES

Lecturer in Classical Electromagnetics and Biomedical Electromagnetics

- [2022] [International PhD School](#) on electromagnetic wave/biological tissue interaction, EUMW, Milan, Italy. Invited tutorial in Biomedical Electromagnetics for PhD student and early stage researchers.
- [2018, 2021] [5G International PhD School](#), Rome, Italy. Invited tutorial in Biomedical Electromagnetics.
- [2019] [European School of Antennas](#), London, UK. Invited lecturer at Antenna Human Body Interactions Course.
- [2015] [Invited lecturer at Uppsala University](#), Sweden (MS and PhD level).
- [2012-2022] [Graduate course](#) (MS level) at Medical Physics department, University of Rennes 1, France.
- [2011-2022] [Undergraduate courses](#) in Electromagnetics and Theory of Bioelectromagnetics, INSA, France.

RECENT JOURNAL PUBLICATIONS (LAST 3 YEARS)

- [1] R. Orlacchio, D. Nikolayev, Y. Le Page, Y. Le Drean, M. Zhadobov. Millimeter-wave heating in vitro: local microscale temperature measurements correlated to heat shock cellular response. *IEEE Transactions on Biomedical Engineering*, 69(2), pp. 840 – 848, Feb. 2022.
- [2] Z. Haider, Y. Le. Dréan, G. Sacco, D. Nikolayev, R. Sauleau, M. Zhadobov. High-resolution model of human skin appendages for electromagnetic dosimetry at millimeter waves. *IEEE J. Microwaves*, 2(1), pp. 214 – 227, Jan. 2022.
- [3] M. Ziane, M. Zhadobov, R. Sauleau. High-resolution power density measurement technique in the near-field accounting for antenna/body coupling at millimeter-waves. *IEEE Antennas and Wireless Propagation Letters*, 20(11), pp. 2151-2155, Nov. 2021.
- [4] B. Mohamadzade, R. Simorangkir, R. Hashmi, R. Gharaei, A. Lalbakhsh, S. Shrestha, M. Zhadobov, R. Sauleau. A conformal, dynamic pattern-reconfigurable antenna using conductive textile-polymer composite. *IEEE Transactions on Antennas and Propagation*, 69(10), pp. 6175 – 6184, Oct. 2021.
- [5] Z. Haider, D. Nikolayev, Y. Le. Dréan, A. De. Angelis, M. Liberti, R. Sauleau, M. Zhadobov. Local dosimetry at cellular and subcellular level in HF and millimeter-wave bands. *IEEE J. Microwaves*, 1(4), pp. 1003-1014, Sept. 2021.
- [6] G. Sacco, S. Pisa, M. Zhadobov. Impact of textile on electromagnetic power and heating in near-surface tissues at 26 GHz and 60 GHz. *IEEE J. Electromagnetics, RF, Microwaves in Medicine and Biology*, 5(3), pp. 262 – 268, Sept. 2021.
- [7] R. Aminzadeh, A. Thielens, M. Zhadobov, L. Martens, W. Joseph. WBAN channel modeling for 900 MHz and 60 GHz communications. *IEEE Transactions on Antennas and Propagation*, 69(7), pp. 4083 – 4092, Jul. 2021.

- [8] G. Sacco, D. Nikolayev, R. Sauleau, M. Zhadobov. Antenna/human body coupling in 5G millimeter-wave bands: do age and clothing matter? *IEEE Journal of Microwaves*, 1(2), pp. 593 – 600, Apr. 2021.
- [9] I. Iliopoulos, S. di Meo, M. Pasian, M. Zhadobov, P. Pouliguen, P. Potier, L. Perregrini, R. Sauleau, M. Ettore. Enhancement of penetration of millimeter waves by field focusing applied to breast cancer detection. *IEEE Transactions on Biomedical Engineering*, 68(3), pp. 959 – 966, March 2021.
- [10] G. Sacco, S. Pisa, M. Zhadobov. Age-dependence of electromagnetic power and heat deposition in near-surface tissues in emerging 5G bands. *Scientific Reports*, 11, 3983(11pp), Feb. 2021.
- [11] A. Sayem, D. Le, R. Simorangkir, T. Bjorninen, K. Esselle, R. Hashmi, M. Zhadobov. Optically transparent flexible robust circularly polarized antenna for UHF RFID tags. *IEEE Antennas and Wireless Propagation Letters*, 19(12), pp. 2334 – 2338, Dec. 2020.
- [12] M. Ziane, R. Sauleau, M. Zhadobov. Antenna / body coupling in the near-field at 60 GHz: impact on the absorbed power density. *Applied Sciences*, 10(12), 7392(16pp), Oct. 2020.
- [13] C. Martin, F. Percevault, K. Ryder, E. Sani, J.-C. Le Cun, M. Zhadobov, R. Sauleau, Y. Le Dréan, D. Habauzit. Effects of radiofrequency radiation on gene expression: a study of gene expressions of human keratinocytes from different origins. *Bioelectromagnetics*, 41(7), pp. 552-557, Oct. 2020.
- [14] M. Koohestani, R. Perdriau, Y. Le Dréan, M. Ettore, M. Zhadobov. A resonant system for in vitro studies emulating wireless power transfer exposure at 13.56 MHz. *Bioelectromagnetics*, 41(5), pp. 369-381, Jul. 2020.
- [15] A. Fall, C. Lemoine, P. Besnier, R. Sauleau, Y. Le Dréan, M. Zhadobov. Exposure assessment in millimeter-wave reverberation chamber using murine phantoms. *Bioelectromagnetics*, 41(2), pp. 121-135, Feb. 2020.
- [16] B. Mohamadzade, R. B. V. B. Simorangkir, R. M. Hashmi, M. Zhadobov, R. Sauleau. A conformal band-notched ultrawideband antenna with monopole-like radiation characteristics. *IEEE Antennas and Wireless Propagation Letters*, 19(1), pp. 203 – 207, Jan. 2020.
- [17] D. Nikolayev, W. Joseph, A. Skrivervik, M. Zhadobov, L. Martens, R. Sauleau. Dielectric-loaded conformal microstrip antennas for versatile in-body applications. *IEEE Antennas and Wireless Propagation Letters*, 18(12), Dec. 2019.
- [18] R. Orlacchio, M. Zhadobov, S. I. Alekseev, D. Nikolayev, R. Sauleau, Y. Le Page, Y. Le Dréan. Millimeter-wave heating in in vitro studies: effect of convection in continuous and pulse-modulated regimes. *Bioelectromagnetics*, 40(8), pp. 553-568, Dec. 2019.
- [19] R. B. V. B. Simorangkir, D. Le, T. Bjorninen, A. Sayem, M. Zhadobov, R. Sauleau. Washing durability of PDMS-conductive fabric composite: realizing washable UHF RFID tags. *IEEE Antennas and Wireless Propagation Letters*, 18(12), pp. 2572 – 2576, Dec. 2019.
- [20] R. Orlacchio, Y. Le Page, Y. Le Dréan, R. Le Guével, R. Sauleau, S. Alekseev, M. Zhadobov. Millimeter-wave pulsed heating in vitro: cell mortality and heat shock response. *Scientific Reports*, 9(1), 15249(11pp), Oct. 2019.
- [21] T. Han, A. Nag, R. Simorangkir, N. Afsarimanesh, H. Liu, S. Mukhopadhyay, Y. Xu, M. Zhadobov, R. Sauleau. Multifunctional flexible sensor based on laser-induced graphene. *Sensors*, 19(16), 3477(15pp), Aug. 2019.
- [22] P. Le Pogam, Y. Le Page, D. Habauzit, M. Doué, M. Zhadobov, R. Sauleau, Y. Le Dréan, D. Rondeau. Untargeted metabolomics unveil alterations of biomembranes permeability in human HaCaT keratinocytes upon 60 GHz millimeter-wave exposure. *Scientific Reports*, 9(1), 9343(10pp), Jun. 2019.
- [23] D. Nikolayev, M. Zhadobov, R. Sauleau. Immune-to-detuning wireless in-body platform for versatile biotelemetry applications. *IEEE Transactions on Biomedical Circuits and Systems*, 13(2), pp. 403 – 412, Apr. 2019.
- [24] D. Nikolayev, W. Joseph, M. Zhadobov, R. Sauleau, L. Martens. Optimal radiation of body-implanted capsules. *Physical Review Letters*, 122(10), 108101(6pp), March 2019.
- [25] S. Di Meo, L. Pasotti, I. Iliopoulos, M. Pasian, M. Ettore, M. Zhadobov, G. Matrone. Tissue-mimicking materials for breast phantoms up to 50 GHz. *Physics in Medicine and Biology*, 64(5), 055006 (13pp), Feb. 2019.

SELECTED INVITED PRESENTATIONS AT INTERNATIONAL CONFERENCES (SINCE 2018)

- [1] M. Zhadobov. Millimeter-wave absorption in biological tissues: physical fundamentals and recent advances. *IEEE IWMTS, Hybrid Workshop*, 4-6 July 2022 (keynote).
- [2] M. Zhadobov. Multi-scale and multi-physics approach applied to mm-wave dosimetry. *Workshop on interaction mechanisms of magnetic fields with biological systems*, Munich, Germany, May 23-25, 2022 (invited speaker).
- [3] M. Zhadobov. Facing challenges of local multi scale and multi physics dosimetry at millimeter waves. *IEEE IMBioC*, China, May 16-18, 2022 (invited speaker).
- [4] M. Zhadobov. Mm waves in bioelectromagnetics and body-centric applications. *THz-Bio*, April 19-23, 2021 (keynote).
- [5] M. Zhadobov. Near-field interactions with the human body at millimeter-wave frequencies. *Smart NanoMaterials: THz Optoelectronics and Photonics Symposium*, Paris, France, Dec. 11-12, 2019 (keynote).
- [6] M. Zhadobov. Human-centered wireless communications at mm waves: antennas, models, exposure assessment. *EU School of Antennas on Body-centric Wireless Communications*, London, UK, Dec. 9-13, 2019 (invited speaker).
- [7] M. Zhadobov. Millimeter-wave technologies for biomedical electromagnetics. *FSM-Workshop*, ETH Zurich, Switzerland, June 18-19, 2019 (invited speaker).
- [8] M. Zhadobov. Assessment of user exposure to millimeter waves in 5G exposure scenarios. *5G: The Global Meeting*, Rome, Italy, Dec. 4-6, 2018 (keynote).
- [9] M. Zhadobov. Mm-wave technologies for body-centric applications. *IRMMW-THz*, Japan, Sept. 2018 (plenary).