Emilija Petronijević

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EDUCATION

University of Rome La Sapienza, Rome, Italy2014-2017PhD StudiesModule: Nonlinear Photonics at the Department of Basic and Applied Sciences for Engineering
PhD Thesis defended with honors on 01/02/20182013-2014University of Belgrade, School of Electrical Engineering, Belgrade, Serbia2013-2014Master StudiesModule: Physical Electronics, Master Thesis defended on 30/09/20142019-2013University of Belgrade, School of Electrical Engineering, Belgrade, Serbia2009-2013

Bachelor Studies Module: Physical Electronics, Bachelor Thesis defended on 06/09/2013 GPA 10.00 out of 10.00

WORK EXPERIENCE

Nonlinear Photonics Laboratory, La Sapienza University of Rome01/02/2021 - presentPostdoctoral fellow01/02/2021 - present

Project "Studio, progettazione e sperimentazione di metasuperfici nel visibile e vicino IR"

- Experiments with chiral molecules by means of a home-built, sensitive set-up monitoring Fluorescence-Detected Circular Dichroism (manipulating chiral molecules in solvents and on solid substrates, excitation with chiral light in the blue range, and the fluorescence detection in the visible range)
- Opto-chiral measurements of transmission and reflection from nanostructures with broken symmetry (excitation with widely tunable near-infrared laser, and measurements of optical spin-dependent properties with different incidence angles and sample orientation)
- Modelling and optimization of chiro-optical properties in transmission and absorption considering elliptical nanohole arrays and metasurfaces with asymmetric shells supporting surface lattice resonances
- Simulations of light emission from asymmetric nanostructures coupled with a nearby emitting material for the polarization- and wavelength-tunable chiral optical emission
- Exploring chiral phenomena in anisotropic 2D materials by means of absorption simulations in metalinsulator-metal configurations and towards the nanostructuring
- Numerical studies of the chirality in the diffraction from low-cost metasurfaces based on asymmetric plasmonic shells and elliptical nanohole arrays; evaluation of the consequences of chiro-optical processes on the temperature changes revealed in the experiments involving photothermal deflection



10/05/2019 - 31/01/2020

Nonlinear Photonics Laboratory, La Sapienza University of Rome

Collaborator of Prof. Sibilia and Prof. Centini

Project "Sviluppo software per il controllo della emissione di radiazione ottica coerente in sistemi nanostrutturati"

• Modelling of large area periodic nanostructures coupled with layer of emitting material, and tuned with a nearby layer of phase change material VO₂

Nonlinear Photonics Laboratory, La Sapienza University of Rome

Postdoctoral fellow

Project "Materiali e dispositivi plasmonici"

- Extrinsic chirality measurements of nanostructured materials, involving circularly polarized input or output, for the monitoring of circular dichroism in extinction, and circular polarization degree in transmission, respectively
- Modelling and optimization of plasmonic nanostructures for chiro-optical control at the nanoscale, and their hybridization with emitting layers for chirality in the visible and near-infrared emission

Nonlinear Photonics Laboratory, La Sapienza University of Rome

Postdoctoral fellow

Project "Materiali a cambiamento di fase"

• Modelling and optimization of photonic devices based on high refractive index dielectric, plasmonic and hybrid metamaterials, and their coupling with thin layers of phase change materials

Nonlinear Photonics Laboratory, La Sapienza University of Rome 01/11/2017 – 30/04/2018 Intern

Project "Fiseda – Studio di materiali a cambiamento di fase"

• Numerical investigation of phase change materials GeTe, Ge₂Sb₂Te₅, and VO₂ by means of parallel optical (finite-difference-time-domain) and thermal (finite-element-method) simulations

Nonlinear Photonics Laboratory, La Sapienza University of Rome

Collaborator of Prof. Sibilia and Prof. Li Voti

Project "Photo-acoustic modelling of non-homogeneous materials"

• Modelling of resonant absorption in dielectric and hybrid plasmonic-dielectric nanowire ensembles and it influence on signals revealed in photo-acoustic spectroscopy

Nonlinear Photonics Laboratory, La Sapienza University of Rome01/11/2014 - 31/10/2017PhD student01/11/2014 - 31/10/2017

• PhD thesis: "*Nanostructured semiconductor-based surfaces for nanoscale light manipulation*": Two possibilities for electromagnetic field manipulation at nanoscale, by means of semiconductor nanoresonators, have been investigated numerically and experimentally: the resonant and circular dichroic behavior of GaAs-based nanowires, and the collective behavior of EIT-like Si-based nanoresonators controlled by thin layers of phase change materials GST and GeTe.

Institute of Physics Belgrade, University of Belgrade

Junior Researcher

- Modelling and optimization of resonant devices for GHz and THz applications using COMSOL and CST
- Exploring liquid crystals for the tuning of the nonlinear effects in periodic resonant devices

TEACHING EXPERIENCE

University of Rome La Sapienza, Rome, Italy Mentoring student during the project of cooperation with the developing countries (Bando cooperazione con i PVS 2017)

The Department of Basic and Applied Sciences for Engineering

10/05/2018 - 09/05/2019

01/08/2017 - 31/10/2017

01/05/2014 - 31/10/2014

2018-2019

01/11/004= 00/04/6010

University of Rome La Sapienza, Rome, Italy Teaching Assistant in Physics (Fisica 1) The Department of Basic and Applied Sciences for Engineering	2017-2018
	University of Belgrade, School of Electrical Engineering, Belgrade, Serbia
Teaching Assistant in Mathematics	
The Department of Mathematics	

University of Belgrade, School of Electrical Engineering, Belgrade, Serbia **Student-mentor**

• Helping students to better understand and complete their exercise in various courses at the first year of studying; helping the international students from developing countries during their exchange year in Belgrade

2012-2013

AWARDS

INTERNATIONAL SCHOOL OF QUANTUM ELECTRONICS, 64th Course "Progress in Photoacoustic & Photothermal Phenomena" 2021

• Best Presentation Award sponsored by Nanoplus Nanosystems And Technologies Gmbh *PREMIO Futuro della 8a Edizione Premio Nazionale GiovedìScienza 2019*

- National Award Giovedi Scienza Futuro for the project "Chirality and Nanostructures" Bandi di Ateneo 2019 Italia
 - Financial support of 2000€ for the start of the research project (2019)

PHOTONICA 2017 - VI International School and Conference on Photonics

• The best student presentation award by the organizing committee (2017)

University of Rome La Sapienza, bando cooperazione con i PVS 2017

• Funding of 7500€ for the scientific and didactic exchange between the Nonlinear Photonics Laboratory and the Department of Physical Electronics, University of Belgrade

SPIE's Optics + Optoelectronics International Symposia, Prague 2017

• The best student oral presentation award (2017)

Bandi di Ateneo 2016 Italia

• Financial support of 1000€ for the start of the research project (2016)

EOS Topical Meeting Capri 2015

- The best student oral presentation award (2015)
- University of Belgrade
 - Valedictorian (2013)

University of Belgrade, School of Electrical Engineering

• Prize for the best student of the Department of Physical Electronics for five years in a row (2009-2014)

Professor Mirko Milic Foundation

• Prize for the best final year student with the highest grade in Electric Circuit Theory (2013) *European Movement in Serbia*

• Meeting Europe in Denmark: one of the 50 best students in Serbia selected to visit Denmark (2008) *Republic competition in physics*

• 1st prize (2008)

Municipalities Jagodina

• October prize for achievements in Physics, Mathematics and the Arts (2005)

COMPUTER SKILLS AND LANGUAGES

 Lumerical FDTD and DEVICE, MATLAB, Optiwave, RSoft Photonics Cad, COMSOL Multiphysics, LabVIEW, BOLSIG+, Python, C, Mathematica, Simulink, PCB Artist, Origin • Serbian – native; English – advanced, with grade A Cambridge Certificate in Advanced English (CAE); Italian – advanced

ARTICLES

- E. Petronijević, A. Belardini, T. Cesca, C. Scian, G. Mattei, and C. Sibilia, "Rich near-infrared chiral behavior in diffractive metasurfaces", Phys. Rev. Appl. 16(1), 014003 (2021).
- A. Belardini, **E. Petronijević**, R. Ghahri, D. Rocco, F. Pandolfi, C. Sibilia, and L. Mattiello, "Fluorescence Spectroscopy of Enantiomeric Amide Compounds Enforced by Chiral Light", accepted in Appl. Sci. (2021).
- **E. Petronijević**, A. Belardini, G. Leahu, T. Hakkarainen, M. Rizzo Piton, E. Koivusalo, and C. Sibilia, "Broadband optical spin dependent reflection in self-assembled GaAs-based nanowires asymmetrically hybridized with Au", Sci. Rep. **11**, 4316 (2021).
- G. Leahu, **E. Petronijević**, R. Li Voti, A. Belardini, T. Cesca, G. Mattei, and C. Sibilia "Diffracted Beams from Metasurfaces: High Chiral Detectivity by Photothermal Deflection Technique", Adv. Opt. Mater. 2100670 (2021).
- E. Petronijević, R. Ghahri, and C. Sibilia, "Plasmonic Elliptical Nanohole Arrays for Chiral Absorption and Emission in the Near-Infrared and Visible Range", Appl. Sci. 11(13), 6012 (2021).
- E. Petronijević, A. Belardini, G. Leahu, T. Cesca, C. Scian, G. Mattei, and C. Sibilia, "Circular dichroism in low-cost plasmonics: 2D arrays of nanoholes in silver", Appl. Sci. 10, 1316 (2020).
- E. Petronijević, H. Ali, N. Zaric, A. Belardini, G. Leahu, T. Cesca, G. Mattei, L. C. Andreani, and C. Sibilia, "Chiral effects in low-cost plasmonic arrays of elliptic nanoholes," Opt Quant Electron **52**, 176 (2020).
- A. Belardini, G. Leahu, **E. Petronijević**, T. Hakkarainen, E. Koivusalo, M. Rizzo Piton, S. Talmila, M. Guina, and Concita Sibilia, "Circular Dichroism in the Second Harmonic Field Evidenced by Asymmetric Au Coated GaAs Nanowires," Micromachines **11**, 225 (2020).
- **E. Petronijević** and C. Sibilia, "Thin films of phase change materials for light control of metamaterials in the optical and infrared spectral domain," Opt Quant Electron **52**, 110 (2020).
- T. Cesca, C. Scian, **E. Petronijević**, G. Leahu, R. Li Voti, G. Cesarini, R. Macaluso, M. Mosca, C. Sibilia, and G. Mattei, "Correlation between in-situ structural and optical characterizations of the semiconductor-to-metal phase transition of VO2 thin films on sapphire", *Nanoscale* **12**, 851 (2020).
- E. Petronijević, E. M. Sandoval, M. Ramezani, C. L. Ordóňez-Romero, C. Noguez, F. A. Bovino, C. Sibilia, and G. Pirruccio, "Extended Chiro-optical Near-Field Response of Achiral Plasmonic Lattices", *J. Phys. Chem. C* 123, 38, 23620-23627 (2019).
- E. Petronijević, M. Centini, T. Cesca, G. Mattei, F. Bovino, and C. Sibilia, "Control of Au nanoantenna emission enhancement of magnetic dipolar emitters by means of VO2 phase change layers", *Opt. Express* 27(17), 24260 (2019).
- E. Petronijević, G. Leahu, V. Di Meo, A. Crescitelli, P. Dardano, E. Esposito, G. Coppola, I. Rendina, M. Miritello, M. G. Grimaldi, V. Torrisi, G. Compagnini, and C. Sibilia, "Near-infrared modulation by means of GeTe/SOI based metamaterial", *Opt. Lett.* **44**(6), 1508-1511 (2019).
- E. Petronijević, G. Leahu, R. Li Voti, A. Belardini, C. Scian, N. Michieli, T.Cesca, G.Mattei, and C. Sibilia, *Appl. Phys. Lett.* **114**, 053101 (2019).
- **E. Petronijević** and C. Sibilia, "Enhanced near-field chirality in periodic arrays of Si nanowires for chiral sensing", *Molecules* **24**(5), 853 (2019).
- T. Hakkarainen, E. Petronijević, M. Rizzo Piton, and C. Sibilia, "Demonstration of extrinsic chirality of photoluminescence with semiconductor-metal hybrid nanowires", *Sci. Rep.* 9, 5040 (2019).
- E. Petronijević, G. Leahu, A. Belardini, M. Centini, R. Li Voti, T. Hakkarainen, E. Koivusalo, M. Rizzo Piton, S. Suomalainen, M. Guina, and C. Sibilia, "Photo-Acoustic Spectroscopy Reveals Extrinsic Optical Chirality in GaAs-Based Nanowires Partially Covered with Gold", *Int. J. Thermophys.* **39**(3), 45 (2018).
- E. Petronijević, G. Leahu, A. Belardini, M. Centini, R. Li Voti, T. Hakkarainen, E. Koivusalo, M. Rizzo Piton, S. Suomalainen, M. Guina, and C. Sibilia, "Resonant Absorption in GaAs-Based Nanowires by Means of Photo-Acoustic Spectroscopy", *Int. J. Thermophys.* 39(4), 46 (2018).
- E. Petronijević, M. Centini, A. Belardini, G. Leahu, T. Hakkarainen, and C. Sibilia, "Chiral near-field manipulation in Au-GaAs hybrid hexagonal nanowires", *Opt. Express* **25**(13), 14148 (2017).

- G. Leahu, **E. Petronijević**, A. Belardini, M. Centini, R. Li Voti, T. Hakkarainen, E. Koivusalo, M. Guina, and C. Sibilia, "Photo-acoustic spectroscopy revealing resonant absorption of self-assembled GaAs-based nanowires", *Sci. Rep.* **7**(1), 2833 (2017).
- P. Osewski, A. Belardini, **E. Petronijević**, M. Centini, G. Leahu, R. Diduszko, D. A. Pawlak, and C. Sibilia, "Self-Phase-Matched Second-Harmonic and White-Light Generation in a Biaxial Zinc Tungstate Single Crystal", *Sci. Rep.* **7**, 45247 (2017).
- G. Leahu, **E. Petronijević**, A. Belardini, M. Centini, C. Sibilia, T. Hakkarainen, E. Koivusalo, M. Rizzo Piton, S. Suomalainen, and M. Guina, "Evidence of Optical Circular Dichroism in GaAs-Based Nanowires Partially Covered with Gold", *Adv. Opt. Mater.* **5**(16), 1601063 (2017).
- E. Petronijević, G. Leahu, V. Mussi, C. Sibilia, and A. F. Bovino, "Photoacoustic technique for the characterization of plasmonic properties of 2D periodic arrays of gold nanoholes", *AIP Adv.* 7(2), 025210 (2017).
- E. Petronijević and C. Sibilia, "All-optical tuning of EIT-Like dielectric metasurfaces by means of chalcogenide phase change materials", *Opt. Express* 24(26), 30411 (2016).

CONFERENCE PROCEEDINGS

- A. Belardini, **E. Petronijević**, G. Leahu, T. Cesca, C. Scian, F. Pandolfi, G. Mattei, L. Mattiello, and C. Sibilia, "Asymmetric hole array: Tuning the optical circular dichroism for chiral molecules sensing", *Proceedings of SPIE The International Society for Optical Engineering*, *11344*, *art. no. 113440B* (2020).
- R. Li Voti, G. Leahu, E. Petronijević, A. Belardini, M. Centini, C. Sibilia, and M. Bertolotti, "Advances in photoacoustic and photothermal techniques for nondestructive characterization at nanoscopic scale", *Optics InfoBase Conference Papers, Part F143-EQEC 2019, art. no. 2019-jsiv_3_5* (2019).
- A. Belardini, J. Collins, D. C. Hooper, E. Petronijević, T. Hakkarainen, E. Koivusalo, M. R. Piton, S. Soumalainen, M. Guina, V. K. Valev, and C. Sibilia, "Nonlinear chiroptical response of GaAs nanowires partially covered by Au", *Optics InfoBase Conference Papers, Part F140-CLEO_Europe 2019, art. no. 2019-cd_p_13 (2019).*
- E. Petronijević, G. Leahu, R. Li Voti, A. Belardini, C. Scian, N. Michieli, T. Cesca, G. Mattei, and C. Sibilia, "Hybrid metal-polystyrene metasurfaces: Circular dichroism evidenced by means of photo-acoustic technique", *Optics InfoBase Conference Papers, Part F140-CLEO_Europe 2019, art. no.* 2019-ck_p_3 (2019).
- E. Petronijević, M. Centini, T. Cesca, G. Mattei, and C. Sibilia, "VO2 phase change control of Au nanorod emission enhancement of magnetic dipolar emitters", *Optics InfoBase Conference Papers, Part F143-EQEC 2019, art. no. 2019-eh_p_17 (2019).*
- A. Belardini, J. T. Collins, D. C. Hooper, G. Leahu, **E. Petronijević**, M. Centini, R. Li Voti, T. Hakkarainen, E. Koivusalo, M. Rizzo Piton, S. Soumalainen, M. Guina, V. Valev, and C. Sibilia, "Second harmonic generation circul dichroism in Au coated GaAs-based nanowires", *IET Conference Publications 2018 (CP748) (2018)*.
- G. Leahu, A. Belardini, E. Petronijević, R. Li Voti, C. Sibilia, T. Cesca, and G. Mattei, "Thermal scan of metal based metasurface and evidence of circular dichroism and optothermal anisotropy", 2018 Conference on Lasers and Electro-Optics, CLEO 2018 Proceedings, 2018, 8426923 (2018).
- A. Belardini, G. Leahu, **E. Petronijević**, M. Centini, R. Li Voti, C. Sibilia, T. Hakkarainen, E. Koivusalo, M. Rizzo Piton, S. Suomalainen, and M. Guina, "GaAs-based nanowires partially covered with gold give rise to optical circular dichroism", *Optics InfoBase Conference Papers, Part F82-CLEO_Europe 2017, 1 p. (2017).*
- E. Petronijević, and C. Sibilia, "All-optically tunable EIT-like dielectric metasurfaces hybridized with thin phase change material layers", *Proc. SPIE 10228, 102280K (2017).*
- T. Hakkarainen G. Leahu, E. Petronijević, A. Belardini, M. Centini, R. Li Voti, E. Koivusalo, M. Rizzo Piton, M. Guina, and C. Sibilia, "Photo-acoustic spectroscopy of resonant absorption in III-V semiconductor nanowires", 2017 Conference on Lasers and Electro-Optics (CLEO), pp. 1-2 (2017).
- F. A. Bovino, V. Mussi, G. Leahu, A. Benedetti, **E. Petronijević**, and C. Sibilia, "About optical coupling properties of 2D plasmonic nanostructures", *IET Conference Publications* (2015).

• A. Belardini, P. Osewski, **E. Petronijević**, D. A. Pawlak, M. Centini, and C. Sibilia, "Second Harmonic Generation from ZnWO₄ single crystal", *Proceedings CLEO/Europe - EQEC* (2015).

CONFERENCES, SCHOOLS and WORKSHOPS

- **Invited talk** at the SNAIA conference Smart NanoMaterials 2021, 07-10 December 2021, Paris (France)
- Oral presentation at the International School of Quantum Electronics, 64th course "Progress in Photoacoustic and Photothermal Phenomena", 16-23 October 2021, Erice (Italy)
- Oral and poster presentations, and chairing three conference sessions at EOSAM 2021, 13-17 September 2021, Rome (Italy)
- Oral and poster presentations at CLEO/Europe-EQEC Conference, 21-25 June 2021, all-virtual
- Oral presentation at NanoInnovation 2020, 15-18 September 2020, Rome (Italy)
- Oral presentation at the 2020 Conference on Lasers and Electro–Optics ("CLEO"), 11-15 May 2020, all-virtual
- **Invited talk** at the 13th Photonic Workshop 2020, 08-12 March 2020, Kopaonik (Serbia)
- **Invited presentation** at the MEETropolitan35 Festival 2021, science divulgation, 26-27 October 2019, Cagliari, Sardinia (Italy)
- Oral presentation at Capri EOS Topical Meeting 2019, 9-11 September 2019, Capri (Italy)
- Oral presentation at PHOTONICA 2019 VII International School and Conference on Photonics, 26-30 August 2019, Belgrade (Serbia)
- **Invited talk** at the 20th International Conference on Photoacoustic and Photothermal Phenomena, 06-12 July 2019, Moskow (Russia)
- Three poster presentations at CLEO/Europe-EQEC Conference, 23-27 June 2019, Munich (Germany)
- Oral presentation at E\PCOS 2018 European Phase Change and Ovonic Symposium, 23-25 September 2018, Catania (Italy)
- The International Summer School: "Basic Photothermal and Photoacoustic Techniques: Theory, Instrumentation and Application", 07-12 September 2018, Erice (Italy)
- Short term scientific mission at the Optoelectronics Research Center, Tampere University of Technology, 12-24 April 2018, Tampere (Finland)
- COST conference on Nanoscale Quantum Optics, 13-16 February 2018, Prague (Czech Republic)
- Oral presentation at Capri EOS Topical Meeting 2017, 10-14 September 2017, Capri (Italy)
- PHOTONICA 2017 VI International School and Conference on Photonics, 28th August – 1st September 2017, Belgrade (Serbia)
- Oral presentations at 19th International Conference on Photoacoustic and Photothermal Phenomena, 16-20 July 2017, Bilbao (Spain)
- SIE 2017, the 49th Annual Meeting of the Associazione Società Italiana di Elettronica (SIE), 21-23 June 2017, Palermo (Italy)
- Oral presentations at Fotonica 2017 AEIT, 19th edition, 03-05 May 2017, Padova (Italy)
- Oral presentation at SPIE's Optics + Optoelectronics International Symposia, 24-27 April 2017, Prague (Czech Republic)
- Oral presentation at NanoInnovation 2016, 20-23 September 2016, Rome (Italy)
- META'16, the 7th International Conference on Metamaterials, Photonic Crystals and Plasmonics, 25-28 July 2016, Malaga (Spain)

- School of Photonics 2016: "Plasmonics and Nano-Optics", 10-14 July 2016, Cortona (Italy)
- 9th Photonics Workshop 2016, 02-04 March 2016, Kopaonik (Serbia)
- Oral presentation at the conference of Nanoscience and Nanotechnology, 28th September – 2nd October 2015, Frascati (Italy)
- Oral presentation at Capri EOS Topical Meeting 2015, 17-19 September 2015 Capri (Italy)
- Poster presentation at 18th International Conference on Photoacoustic and Photothermal Phenomena, 6-10 September 2015, Novi Sad (Serbia)
- Gender Balance and WG3 Meeting on Nanoscale Quantum Coherence, 02-03 July 2015, Florence (Italy)
- Surface Plasmons and Plasmonics Workshop, 7-10 June 2015, Santa Margherita Ligure (Italy)
- Oral presentation at Fotonica 2017 AEIT, 19th edition, 06-08 May 2015, Turin (Italy)
- Nanoscale Quantum Optics Cost Action Kick-off Workshop, 8-9 April 2015, Belgrade (Serbia)

PROFESSIONAL MEMBERSHIPS AND COORDINATION

- Representative of research fellows at the Department of Basic and Applied Sciences for Engineering, La Sapienza University of Rome (2019-present)
- Guest Editor for the open access journal Applied Sciences, IF: 2.679, ISSN 2076-3417, Special Issue "Optical Chirality: Structures, Detection and Applications" (2020-present)
- Session chairperson at the EOSAM 2021, 13-17 September 2021, Rome (Italy)
- Member of the European Optical Society (2021-present)
- Member of the Italian Society of Optics and Photonics (2021-present)
- Member of OPTICA, formerly the Optical Society of America (2021-present)
- Member of the Italian Society of Electronics (2017)

INTERESTS AND HOBBIES

• Opera singing, guitar, piano, rock music