

**UNIVERSITY OF MILAN**

Public selection for recruiting No.01 research fellow(s) under art.24, paragraph 3.b, of Law No.240/2010 for competition sector 02/B2-Theoretical Physics of Matter, (scientific-disciplinary sector 02/B2 - Theoretical Physics of Matter) at the Department of Aldo Pontremoli Department of PHYSICS, (announcement published in Official Gazette No. 17 of March 01, 2022) - Competition code 4956

## Muhammad Khalid

### CURRICULUM VITAE

**PERSONAL DATA**

<b>SURNAME</b>	KHALID
<b>NAME</b>	MUHAMMAD
<b>DATE OF BIRTH</b>	27/07/1987

**QUALIFICATIONS****DEGREE**

Degree:	Doctor of Philosophy (PhD) in Electromagnetics
University:	“La Sapienza” University of Rome, Rome, Italy
Awarded on:	June 15, 2016
Subject:	Electromagnetics

**DOCTORAL DEGREE OR EQUIVALENT QUALIFICATION EARNED IN ITALY OR ABROAD / MEDICAL SPECIALISATION DIPLOMA OR EQUIVALENT QUALIFICATION, FOR THE RELEVANT SECTORS, EARNED IN ITALY OR ABROAD**

Degree:	Doctor of Philosophy (PhD) in Electromagnetics
University:	“La Sapienza” University of Rome, Rome, Italy
Awarded on:	June 15, 2016
Subject:	Electromagnetics

**RESEARCH CONTRACTS, RESEARCH FELLOWSHIP CONTRACTS, POSTDOCTORAL SCHOLARSHIPS OR SIMILAR CONTRACTS**

Dec. 2021 - To date	Post-doctoral researcher at the Institute of Nanotechnology, National Research Council (CNR), Lecce, Italy.
Apr. 2017 - Dec. 2021	Post-doctoral researcher at the Center for Biomolecular Nanotechnologies, Italian Institute of Technology (IIT), Arnesano, Italy.
Jun. 2016 - Mar. 2017	Research Assistant at the Department of Information Engineering, Electronics and Telecommunications, “La Sapienza” University of Rome, Italy.

**TEACHING ACTIVITIES AT ITALIAN OR FOREIGN UNIVERSITIES**

Feb. 2011 - Jun. 2012	<b>Visiting faculty member</b> at the Department of Electronics, Quaid-i-Azam University, Islamabad, Pakistan. I taught to MSc students several courses including Electromagnetic theory, digital and analog electronics, computer programming and digital logic design. 03 hours per week for each course.
Feb. 2010 - Feb. 2011	<b>Visiting lecturer</b> at the Department of Physics, COMSATS University Islamabad, Pakistan. I taught courses on C/C++, Matlab and microprocessor based design at the undergraduate level. 03 hours per week for each course.

## SPEAKING AT NATIONAL AND INTERNATIONAL CONFERENCES AND CONVENTIONS

1. **M. Khalid**, F. De Luca, A. Noor and C. Ciraci, "Nonlinear Plasmonics: from classical to quantum effects", oral presentation at URSI GASS, August 28-September 04, 2021, Rome, Italy.
2. **M. Khalid** and C. Ciraci, "Exploiting electron spill-out for enhanced second-harmonic generation", poster presentation at Metamaterials 2021, New York, USA, August 02-07, 2021.
3. (*Invited talk*) **M. Khalid** and C. Ciraci, "Quantum spill-out induced enhancement in surface nonlinear plasmonic response", META 2021- Warsaw, Poland, July 21-23, 2021.
4. **M. Khalid** and C. Ciraci, "COMSOL Simulations to study nonlocal properties of an Au nanoshell using Quantum Hydrodynamic Theory", oral presentation at COMSOL Conference, October 17-21, 2017, Rotterdam, Netherlands.
5. **M. Khalid** and C. Ciraci, "Optical Response of Spherical Core-shell Structures with Sub-nanometer Gaps", oral presentation at Fotonica, May 23-25, 2018, Lecce, Italy.
6. **M. Khalid**, F. D. Sala and C. Ciraci, "Nonlocal optical properties of spherical nanomatryoshkas with extended plasmonic gaps", oral presentation at NanoPlasm, June 10-15, 2018, Cetraro, Italy.
7. **M. Khalid**, F. D. Sala and C. Ciraci, "Analysis of Spherical Core-Shell Structures with Sub-nanometer Plasmonic Gaps", oral presentation at Plasmonica 2018, July 04-06, 2018, Florence, Italy.
8. **M. Khalid**, F. D. Sala and C. Ciraci, "Numerical study of spherical nanomatryoshkas by using quantum hydrodynamic theory", oral presentation at SPIE. International Symposium on Optics and Photonics, August 19-23, 2018, San Diego, California, USA.
9. **M. Khalid**, F. D. Sala and C. Ciraci, "Nonlocal Optical Properties of Spherical Nanomatryoshkas", poster presentation at Trends in Nanotechnology, September 03-07, 2018, Lecce, Italy.
10. **M. Khalid**, F. D. Sala and C. Ciraci, "Nonlocal Optical Properties of Spherical Nanomatryoshkas", oral presentation at Nanophotonics and Micro/Nano Optics International Conference, October 01-03, 2018, Rome, Italy.
11. R. Jurga, **M. Khalid**, F. D. Sala and Ciraci, "Electron Spill-Out Effects on Rabi Splitting in Plasmonic Systems", poster presentation at the 9th International Conference on Surface Plasmon Photonics, May 26-31, 2019, Copenhagen, Denmark.
12. E. Sassolini, N. Tedeschi, **M. Khalid**, E. Lia, M. D. Astorino and F. Frezza, "A simple wide-angle metamaterial absorber", XXI RiNEm Italian Meeting on Electromagnetics, Parma, Italy, September 12-14, 2016.
13. **M. Khalid**, N. Tedeschi, and F. Frezza, "Analysis of DB unit cell and extraction of its effective constitutive parameters", XXI RiNEm Italian Meeting on Electromagnetics, Parma, Italy, September 12-14, 2016.
14. **M. Khalid**, "Effect of extreme anisotropy on the reflection from the interface of a matched uniaxial medium", XXI RiNEm Italian Meeting on Electromagnetics, Parma, Italy, September 12-14, 2016.
15. **M. Khalid**, N. Tedeschi, and F. Frezza, "Numerical Investigation of DB Metamaterial and Retrieval of its Effective Parameters", International Symposium on Electromagnetic Theory, Espoo, Finland, August 14-18, 2016.
16. **M. Khalid**, N. Tedeschi, and F. Frezza, "Plane-wave Reflection from the Interface of a Novel Uniaxial Medium with Extreme Parameters", International Symposium on Electromagnetic Theory, Espoo, Finland, August 14-18, 2016.
17. **M. Khalid**, N. Tedeschi, and F. Frezza, "Electromagnetic reflection at an interface of a lossy electric-magnetic uniaxial medium and its application", XXXI URSI General Assembly and Scientific Symposium, Beijing, China, August 16-23, 2014.
18. **M. Khalid**, "On the application of a particular electric-magnetic uniaxial lossy medium", XX RiNEm Italian Meeting on Electromagnetics, Padova, Italy, September 15-18, 2014.

## NATIONAL AND INTERNATIONAL AWARDS AND ACCOLADES FOR RESEARCH ACTIVITY

1. **Young Scientist Award** at the International Symposium on Electromagnetic Theory (EMTS 2016), Espoo, Finland, held on August 14-18, 2016.
2. **Young Scientist Award** at the XXXI URSI General Assembly and Scientific Symposium, Beijing, China held on August 16-23, 2014.

## RESEARCH GRANTS

1. "Avvio alla ricerca" grant awarded by the Italian Ministry of Education, Research and University for the year 2014 for the project: "Realizzazione di un materiale artificiale anisotropo tramite tecniche di omogeneizzazione".
2. Research Proposal entitled as "Quantum Magneto-plasmonics and all-optical integrated devices (QMAID)", submitted to the Italian Ministry of Education and Research for the Italian Science Fund (FIS) as a Principle Investigator (Submitted in Dec. 2021).

## QUALIFICATIONS UNDER ART.24, PARAGRAPH 3.a AND 3.b, OF LAW No.240/2010 OF 30 DECEMBER 2010

Post-doctoral research fellowship awarded by the Italian Institute of Technology, Arnesano (LE), Italy from 01/04/2017 to 30/12/2021.

## SCIENTIFIC PRODUCTION

### SCIENTIFIC PUBLICATIONS

1. A. Noor, **M. Khalid**, F. De Luca, H. M. Baghramyan, M. Castriotta, A. D'Orazio and C. Ciraci, "Second-harmonic generation in plasmonic waveguides with nonlocal response and electron spill-out", submitted to Phys. Rev. B, 2022. arXiv: <https://arxiv.org/abs/2202.03363>
2. **M. Khalid**, O. Morandi, E. Mallet, P. A. Hervieux, G. Manfredi, A. Moreau, and C. Ciraci, "Influence of the electron spill-out and nonlocality on gap-plasmons in the limit of vanishing gaps", Phys. Rev. B, vol. 104, 155435, 2021. Publisher: American Physical Society. DOI: [10.1103/PhysRevB.104.155435](https://doi.org/10.1103/PhysRevB.104.155435)
3. **M. Khalid** and C. Ciraci, "Enhancing second-harmonic generation with electron spill-out at metallic surfaces", Comm. Phys., vol. 3, 214, 2020. Publisher: Nature Springer. DOI: [10.1038/s42005-020-00477-0](https://doi.org/10.1038/s42005-020-00477-0) (The research work was featured on the Journal's website for the month of April 2021.)
4. E. Sassolini, M.D. Astorino, **M. Khalid**, E. Lia, Marco Muzi, Patrizio Simeoni, Nicola Tedeschi, Andrea Veroli, Alessandro Simonetto and Fabrizio Frezza, "Design, realization and characterization of a wide-angle microwave metasurface absorber", Res. Dev. Material Sci., vol. 11 (4), 1212–1217, 2019. Publisher: CRIMSON. DOI: [10.31031/RDMS.2019.11.000770](https://doi.org/10.31031/RDMS.2019.11.000770)
5. C. Ciraci, R. Jurga, **M. Khalid** and F. D. Sala, "Plasmonic quantum effects on single-emitter strong coupling", Nanophotonics, vol. 8(10), 1–13, 2019. Publisher: Nanophotonics. DOI: [10.1515/nanoph-2019-0199](https://doi.org/10.1515/nanoph-2019-0199)
6. **M. Khalid** and C. Ciraci, "Numerical Analysis of Nonlocal Optical Response of Metallic Nanoshells", Photonics, vol. 6 (2), 39, 2019. Publisher: MDPI. DOI: [10.3390/photonics6020039](https://doi.org/10.3390/photonics6020039)
7. **M. Khalid**, F. D. Sala and C. Ciraci, "Optical properties of plasmonic core-shell nanomatryoshkas: a quantum hydrodynamic analysis", Optics Express, Vol. 26, No. 13, 17322–17334, 2018. Publisher: Optical Society of America. DOI: [10.1364/OE.26.017322](https://doi.org/10.1364/OE.26.017322)
8. **M. Khalid**, N. Tedeschi and F. Frezza, "Analysis of reflection from a novel anisotropic lossy medium characterized by particular material properties", Journal of Electromagnetic Waves and Applications, Vol. 31, No. 8, 798–807, 2017. Publisher: Taylor and Francis. DOI: [10.1080/09205071.2017.1317038](https://doi.org/10.1080/09205071.2017.1317038)
9. **M. Khalid**, N. Tedeschi and F. Frezza, "On a lossy electric-magnetic uniaxial medium and its applications to boundary conditions", IEEE Trans. Antennas. Propag., Vol. 63, No. 4, 1686–1692, April 2015. Publisher: IEEE. DOI: [10.1109/TAP.2015.2393873](https://doi.org/10.1109/TAP.2015.2393873)
10. **M. Khalid**, A. A. Syed and Q. A. Naqvi, "Circular cylinder with D'B, DB', and D'B' boundary conditions placed in chiral and chiral nihility media", International Journal of Applied Electromagnetics and Mechanics, Vol. 44, 59-68, 2014. Publisher: IOS Press. DOI: [10.3233/JAE-131736](https://doi.org/10.3233/JAE-131736)
11. **M. Khalid**, S. Ahmed, A. A. Syed and Q. A. Naqvi, "Electromagnetic Response of a Circular DB Cylinder in the Presence of Chiral and Chiral Nihility Metamaterials", Progress In Electromagnetic Research M, Vol. 21, 253-266, 2011. Publisher: EMW Publishing. DOI: [10.2528/PIERM11051906](https://doi.org/10.2528/PIERM11051906)

12. **M. Khalid** and M. Abbas, “Comments on: Dyadic Green’s Function of a PEMC cylinder”, Applied Physics A, 105, 1033 (2011). Publisher: Springer. DOI: [10.1007/s00339-011-6661-0](https://doi.org/10.1007/s00339-011-6661-0)

Date

17/03/2022

Place

Monteroni di Lecce