



J. D. Massayuki Kondo, Ph.D.

Associate Professor of Physics at UFSC

Details

Department of Physics – Federal University of Santa Catarina – UFSC

Florianópolis, Santa Catarina – Brasil

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Summary

- Currently associate Professor at the UFSC's **Physics Department**.
- 14+ years of experience research **on Rydberg Physics in ultra-cold and hot samples**.
- Development of ultra-cold Rydberg atoms experiments from the ground up. **MOT and Optical Traps**.
- Design and assembly (CW) laser based on **SHG systems 960nm/480nm** for Rydberg excitation.
- 11+ years of expertise in **Electromagnetically Induced Transparency (EIT) Spectroscopy in Rubidium and Cesium**, using up to four photon couplings.
- Experience in **microwave** and **terahertz** radiation **electrometry** in free space reference vapor cells and ultra-cold atoms.
- Expertise in **mechanical design** as ultra-high vacuum chambers, optomechanical parts, heating and cooling atomic samples. Hands-on experience in **programming, control**, and **data acquisition** interfaces.
- Led multiple projects as, electrometry using Rydberg atoms, non-equilibrium phase transitions in Rydberg systems, multi-photon excitation to Rydberg states, optical and microwave cavities designs.
- 1000+ hours of teaching optics and electromagnetism.
- 18+ Publication in scientific journals as **PRA, Optics Letter, Nature Communications and Nature photonics**.
- Several student projects supervision, co-supervision, and advisories.

Skills

Experimental Skills Optomechanical designs, vacuum pumps, laser beam alignment, UHV systems, Tapered Amplifiers, SHG laser bowtie cavities, diode lasers, DFB lasers, (CW) Titanium Sapphire lasers, dye pulsed lasers, experimental interface control, data analysis and data acquisition, laser frequency stabilization, box car integrators, lock-in-amplifiers, photodetectors, photocounting, fluorescence/transmission images, fiber optics couplings, acoustic and electric optical modulators, etc.

Programming languages and software Python, Fortran, SciLab, Latex
Mathematica, LabVIEW, SolidWorks, Inventor, Fusion360, Symplify3d

Languages English (proficiency), Spanish (working proficiency), Portuguese (Native).

Experience

Physics Department at UFSC

Florianópolis, SC, BR

Associate Professor

January 2017 - Present

- Microwave multiphotonic excitation of Rydberg states in a Microwave Cavity [paper in prep.]
 - Design a UHV chamber for ultra-cold Rydberg atoms that double as a microwave cavity.
 - Perform fluorescence spectroscopy and EIT spectroscopy using ultra-cold Rydberg atoms.
- Fabry-Perot Optical Cavity for Frequency Stabilization [1]
 - Opto-Mechanical design of an Optical Cavity for Laser frequency stabilization.
 - Active thermal stabilization and dual wavelength locking 960/780nm.
- Microwave electrometry in Rubidium glass reference cell [2]
 - Microwave assisted by Electromagnetically Induced Transparency using polarization spectroscopy.
 - Characterizing 3D printed microwave bulk and meta surface lenses using EIT electrometry.
- Triangular Optical Cavity for mode sorting vector vortex beams [3]

- Terahertz real-time imaging using Cesium Rydberg atoms [4]
 - Design of a cell heater transparent to Terahertz radiation.
 - Perform three photon excitations to Rydberg states, and fluorescence image.
- Terahertz non-linear sensor using bistability phase transition induced by Rydberg interactions [5]
 - Mapping parameter space of phase transition in presence of Terahertz radiation.
 - Implementation of latching system using phase transition windows controlled by Terahertz.
- Exploring quantum memories in room temperature vapor cell using Rydberg states [6]
 - Three photon EIT scheme creating a phase free quantum interference.
 - Using EIT for dressed state uniform-phase spin waves light storage.

Light and matter group – University of São Paulo

São Carlos, SP, BR

- Exploring Rydberg atoms Förster resonances controlled by static electric field using ultra-cold atoms [7]
- Studying dipole-dipole interaction between Rydberg atoms held in a unidimensional optical Trap [8]

Education

Master's degree	Master of Science (M.Sc.) in Physics University of São Paulo – USP, Graduation year: 2010
Doctorate	Doctor of Philosophy (Ph.D.) in sciences University of São Paulo – USP, Graduation year: 2014
Postdoctoral Fellowship	Durham University – UK Atoms, Molecules and Optical Physics, Duration: 01/2015-12/2016

Grants and Awards

2024-2027	Studying Rydberg atoms interacting with microwave fields.	<i>Grant: U.S.Army</i>
2021-2024	Exploring interactions of Rydberg atomic states with microwave fields in cold atoms	<i>Grant: FAPESP</i>
2019-2022	Exploring optical bistability in systems with Fano quantum interferences.	<i>Grant: CNPq</i>
2008-2010	Studying Stark effects on Förster resonances in ultra-cold Rydberg-Rydberg atomic interactions.	<i>Grant: FAPESP</i>

Administrative Roles

- Physics Department Mechanical Workshop Head Coordinator
- Associate Undergraduate Program Coordinator for the Physics Program
- Member of University Board of Trustees
- Chairman of Physical Space Committee at Physics Department

Referee of Scientific Journals

- Applied Optics; Optics Letter; Optics Express; Photonics, Atoms, Physica Scripta; J. O. S. A B-Optical Physics; Journal of Physics B-Atomic, Molecular and Optical Physics.

Published Related Articles

- [1] “Multiphoton-dressed Rydberg excitations in a microwave cavity with ultracold Rb atoms”, *PRAL*, vol. 110, , 2024.
- [2] “Affordable medium-finesse optical cavity for diode laser stabilization”, *Applied Physics B*, vol. 130, p. 60, 2024.
- [3] “Polarization spectroscopy applied to electromagnetically induced transparency in hot Rydberg atoms using a laguerre–gaussian beam” *Atoms*, vol. 10, no. 2, 2022.
- [4] “Resonance of vector vortex beams in a triangular optical cavity”, *Scientific Reports*, vol. 14, no. 1, p. 10542, 2024.
- [5] “Real-time near-field terahertz imaging with atomic optical fluorescence”, *Nature Photonics*, vol. 11, no. 1, p. 40, 2017.
- [6] “A terahertz-driven non-equilibrium phase transition in a room temperature atomic vapour”, *Nature Communications*, vol. 9, no. 1, p. 3567, 2018.
- [7] “Dressed-state electromagnetically induced transparency for light storage in uniform-phase spin waves”, *Phys. Rev. A*, vol. 94, p. 033840, 2016.
- [8] “Role of multilevel Rydberg interactions in electric-field-tuned Förster resonances”, *Phys. Rev. A*, v. 93, p. 012703, 2016.
- [9] “Two-body Förster resonance involving Rb nD states in a quasi-electrostatic trap”, *Phys. Rev. A*, v. 90, p. 023413, 2014.

Jorge Douglas Massayuki Kondo - CV

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EDUCATION

2011-2014 Doctorate in Physics - [University of São Paulo, São Carlos - Brazil](#)

Thesis Title: *"Study of Collisions Between Ultracold Rydberg Atoms Atomic Samples Trapped in an Optical Dipole Trap", year of degree: 2014.*

Advisor: *Dr. Luis Gustavo Marcassa*

Scholarship: *São Paulo State funding agency - FAPESP*

2009-2010 Master in Physics - [University of São Paulo, São Carlos - Brazil](#)

Master thesis title: *"Molecular resonances in nP states of cold Rydberg atoms"*
Year of degree: 2010.

Advisor: *Dr. Luis Gustavo Marcassa*

Scholarship: *National Science funding agency - CNPq*

2005-2008 Bachelor in Physics - [State University of São Paulo, Rio Claro - Brazil](#)

Undergrad research project: *"Electron Paramagnetic Resonance - EPR (Theoretical analysis), year of degree: 2008.*

Advisor: *Dr. Lygia C. de Moura Walmsley*

Scholarship: *São Paulo State funding agency - FAPESP*

POSTDOCTORATE

2015-2016 Postdoctorate in Atomic and Molecular Physics - [Durham University, Durham - UK](#)

Supervisor: *Professor Adams*

Scholarship: *National Science funding agency - CNPq*

CURRENT POSITION

2016-Curr Associate Professor at UFSC - [Physics Department](#)

Position *Permanent, Full-time - 40 hours a week*

TEACHING ACTIVITIES

2016-Curr Teaching for Engineering courses programs, Chemistry,
Meteorology and Physics programs
Physics III - *Basic electromagnetism and electronic circuit*
Physics IV - *Electromagnetic wave, Optics and Special Relativity*
Electromagnetic Theory II - *Advanced electrodynamics and Relativity*
Static and Dynamic Mechanics for Engineering - *Classical mechanics*
Teaching duties takes 8 to 12 hours per week

ADMINISTRATIVE ROLE

2023-Curr Chairman of the Physical Space Distribution Committee at UFSC Physics Department.

2021-2022 Member of University Board of Trustees
representing the Center of Physical and Mathematical Sciences.

2020-2021 Associate Undergraduate Program Coordinator
for Bachelor's Degree in Physics - [Bachelors in Physics](#)

2019-2021 Member of meteorology course council

2017-2020 Member of Physics department Research Chamber - [Dpt. Research chamber](#)
Representing the Atomic, Molecular and Quantum Optics areas of research

2017-2020 Member of Physics department Research Chamber - [Dpt. Research chamber](#)
Representing the Atomic, Molecular and Quantum Optics areas of research

2018-2020 Member of University High Council - [UFSC-High Council](#)
Representing the teaching body of Center of Physical Sciences and Mathematics

2018-2020 Mechanical Workshop Main Coordinator - [Physics Mechanical Workshop](#)

REFeree OF SCIENTIFIC JOURNALS

2015-Curr International Scientific Journals
Referee on Light-Matter Interactions and Quantum Optics Physics.

- **Applied Optics**
- **Journal of the Optical Society of America B - Optical Physics**
- **Journal of Physics B - Atomic, Molecular and Optical Physics**
- **Journal of the Optical Society of America B**
- **Optics Letter**
- **Optics Express**
- **Photonics**
- **Atoms**
- **Physica Scripta**

RESEARCH PROJECTS

- 2019-Curr** Exploring optical bistability in systems with Fano quantum interferences.
Funding: *National Science Funding Agency - CNPq*
- 2016-2019** Exploring long-range electromagnetic interactions in non-classical non-linear regimes using atomic samples.
Funding: *National Science Funding Agency - CNPq*
- 2015-2016** Exploring Electromagnetic Induced Transparency in Multiphoton processes.
Funding: *National Science Funding Agency - CNPq*
- 2010-2014** Studying Stark effects on Forster resonances in ultra-cold Rydberg-Rydberg atomic interactions.
Funding: *São Paulo State Funding Agency - FAPESP*
- 2008-2009** Controlling Rydberg-Rydberg population transfer using Electric fields on nP states.
Funding: *National Science Funding Agency - CNPq*

INVITED TALKS (More recent)

- 2019-2025** **Title:** *Improving electric field sensitivity using atoms as fundamental atomic sensors*
Conference: *DAMOP - Division of Atomic and Molecular and Optical Physics*
United States - Spokane/WA
- Title:** *Electromagnetic Induced Transparency on hot atomic vapours*
Conference: *Innovative Ideias in Quantum Technology*
International Institute of Physics - Natal/BR
- Title:** *Optical Bistability: Noise Amplifier*
Conference: *Quantum and Classical Systems with Long-Range Interactions*
International Institute of Physics - Natal/BR
- Title:** *Building Quantum Logic Gates with Neutral Atoms*
Conference: *VI Conference of Physics and Astronomy*
UFSC/Physics Department - Florianópolis/BR
- Title:** *Experimental Atomic Physics - Challenges and solutions the path among the rocks*
Conference: *Graduate research Program on Physics and Astronomy*
UFSC/Physics Department - Florianópolis/BR

LANGUAGES

Portuguese Understanding Fluent , Speaking Fluent , Writing Fluent , Reading Fluent
English Understanding Fluent , Speaking Fluent , Writing Fluent , Reading Fluent.

BOARD MEMBER OF EVALUATION COMMITTEES

Master 3

Doctorate 3

SUPERVISION

Master *David Rodríguez Fernández*; [link to paper](#) - Unofficial supervisor

Doctorate *Naomy Duarte Gomes*; [link to paper](#) - Unofficial PhD supervisor
Manuel Alejandro Lefrán Torres; [link to paper](#) - Unofficial PhD supervisor

ACADEMIC UNDERGRADUATES ADVISORIES

Concluded 8

Current 1

ARTICLES PUBLISHED IN SCIENTIFIC JOURNALS

- [1] N. D. Gomes, D. V. Magalhães, J. M. Kondo, and L. G. Marcassa, “Microwave spectroscopy assisted by electromagnetically induced transparency near natural förster resonance on rubidium,” *Results in Physics*, vol. 68, p. 108081, 2025. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S2211379724007666>
- [2] J. D. M. Kondo, S. T. Rittenhouse, D. V. Magalhães, V. Rokaj, S. I. Mistakidis, H. R. Sadeghpour, and L. G. Marcassa, “Multiphoton-dressed rydberg excitations in a microwave cavity with ultracold rb atoms,” *Phys. Rev. A*, vol. 110, p. L061301, Dec 2024. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevA.110.L061301>
- [3] N. Duarte Gomes, V. Marrara Pepino, B.-H. Viana Borges, D. Varela Magalhães, R. de Jesus Napolitano, M. Alejandro Lefrán Torres, J. Douglas Massayuki Kondo, and L. Gustavo Marcassa, “Rydberg atom-based microwave electrometry using polarization spectroscopy,” *Journal of Physics B: Atomic, Molecular and Optical Physics*, vol. 57, no. 23, p. 235502, nov 2024. [Online]. Available: <https://dx.doi.org/10.1088/1361-6455/ad8a34>
- [4] D. Rodriguez Fernandez, M. A. Lefran Torres, M. R. Cardoso, J. D. M. Kondo, M. Saffman, and L. G. Marcassa, “Affordable medium-finesse optical cavity for diode laser stabilization,” *Applied Physics B*, vol. 130, p. 60, 2024. [Online]. Available: <https://link.springer.com/article/10.1007/s00340-024-08190-4>

- [5] L. M. Rodrigues, L. Marques Fagundes, D. C. Salles, G. H. dos Santos, J. M. Kondo, P. H. Souto Ribeiro, A. Z. Khoury, and R. Medeiros de Araújo, “Resonance of vector vortex beams in a triangular optical cavity,” *Scientific Reports*, vol. 14, no. 1, p. 10542, 2024. [Online]. Available: <https://doi.org/10.1038/s41598-024-59630-2>
- [6] D. R. Fernández, M. A. L. Torres, M. R. Cardoso, J. D. M. Kondo, and L. G. Marcassa, “High resolution laser spectroscopy of iodine molecule in the 14400–14600 cm⁻¹ range,” *Journal of Molecular Spectroscopy*, vol. 395, p. 111789, 2023. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0022285223000541>
- [7] N. Duarte Gomes, B. da Fonseca Magnani, J. D. Massayuki Kondo, and L. G. Marcassa, “Polarization spectroscopy applied to electromagnetically induced transparency in hot rydberg atoms using a laguerre–gaussian beam,” *Atoms*, vol. 10, no. 2, 2022. [Online]. Available: <https://www.mdpi.com/2218-2004/10/2/58>
- [8] D. J. Reed, N. Šibalić, D. J. Whiting, J. M. Kondo, C. S. Adams, and K. J. Weatherill, “Low-drift zeeman shifted atomic frequency reference,” *OSA Continuum*, vol. 1, no. 1, pp. 4–12, Sep 2018. [Online]. Available: <https://opg.optica.org/osac/abstract.cfm?URI=osac-1-1-4>
- [9] C. G. Wade, M. Marcuzzi, E. Levi, J. M. Kondo, I. Lesanovsky, C. S. Adams, and K. J. Weatherill, “A terahertz-driven non-equilibrium phase transition in a room temperature atomic vapour,” *Nature Communications*, vol. 9, no. 1, p. 3567, 2018. [Online]. Available: <https://doi.org/10.1038/s41467-018-05597-4>
- [10] C. G. Wade, N. Šibalić, N. R. de Melo, J. M. Kondo, C. S. Adams, and K. J. Weatherill, “Real-time near-field terahertz imaging with atomic optical fluorescence,” *Nature Photonics*, vol. 11, no. 1, pp. 40–43, 2017. [Online]. Available: <https://doi.org/10.1038/nphoton.2016.214>
- [11] N. Šibalić, J. M. Kondo, C. S. Adams, and K. J. Weatherill, “Dressed-state electromagnetically induced transparency for light storage in uniform-phase spin waves,” *Phys. Rev. A*, vol. 94, p. 033840, Sep 2016. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevA.94.033840>
- [12] J. M. Kondo, D. Booth, L. F. Gonçalves, J. P. Shaffer, and L. G. Marcassa, “Role of multilevel rydberg interactions in electric-field-tuned förster resonances,” *Phys. Rev. A*, vol. 93, p. 012703, Jan 2016. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevA.93.012703>
- [13] N. R. de Melo, C. G. Wade, N. Šibalić, J. M. Kondo, C. S. Adams, and K. J. Weatherill, “Intrinsic optical bistability in a strongly driven rydberg ensemble,” *Phys. Rev. A*, vol. 93, p. 063863, Jun 2016. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevA.93.063863>
- [14] J. M. Kondo, N. Šibalić, A. Guttridge, C. G. Wade, N. R. D. Melo, C. S. Adams, and K. J. Weatherill, “Observation of interference effects via four-photon excitation of highly excited rydberg states in thermal cesium vapor,” *Opt. Lett.*, vol. 40, no. 23, pp. 5570–5573, Dec 2015. [Online]. Available: <https://opg.optica.org/ol/abstract.cfm?URI=ol-40-23-5570>
- [15] J. D. M. Kondo, “Study of collisions between ultracold rydberg atoms in atomic samples trapped in an optical dipole trap,” Doctoral Thesis, Instituto de Física de São Carlos, Universidade de São Paulo, São Carlos, December 2014. [Online]. Available: <https://doi.org/10.11606/T.76.2014.tde-03022015-171234>
- [16] J. S. Cabral, J. M. Kondo, L. F. Gonçalves, V. A. Nascimento, L. G. Marcassa, D. Booth, J. Tallant, A. Schwettmann, K. R. Overstreet, J. Sedlacek, and J. P. Shaffer, “Effects of electric fields on ultracold rydberg atom interactions,” *Journal of Physics B: Atomic, Molecular and Optical Physics*, vol. 44, no. 18, p. 184007, sep 2011. [Online]. Available: <https://dx.doi.org/10.1088/0953-4075/44/18/184007>

- [17] J. S. Cabral, J. M. Kondo, L. F. Gonçalves, L. G. Marcassa, D. Booth, J. Tallant, and J. P. Shaffer, “Manipulation of quantum state transfer in cold rydberg atom collisions,” *New Journal of Physics*, vol. 12, no. 9, p. 093023, sep 2010. [Online]. Available: <https://dx.doi.org/10.1088/1367-2630/12/9/093023>
- [18] J. M. Kondo, L. Walmsley, C. Rettori, M. S. Sercheli, A. A. Correa, and E. C. Pereira, “Simultaneous observation of the magnetic and electric behavior in a correlated system near a metal-semiconductor transition: ESR in pellets of conducting polymers,” *Phys. Rev. B*, vol. 80, p. 014410, Jul 2009. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevB.80.014410>