Rodolphe MOMIER

PhD student in Atomic Physics

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Born 16th May 1999 in Vesoul, France

I obtained my bachelor in Theoretical and Applied Physics in June 2019. Since then, I have been working under the supervision of Prof. Claude LEROY (Laboratoire Interdisciplinaire Carnot de Bourgogne - ICB, Dijon, France). In 2021, I obtained an MSc. in Physics, Photonics and Nanotechnologies (PPN) from Université Bourgogne Franche-Comté (UBFC, Dijon, France) during which I performed a research internship at the Institute for Physical Research (IPR), NAS of Armenia supervised by Prof. Claude LEROY and Prof. Aram PAPOYAN (IPR). My fields of interest are atomic spectroscopy, laser physics and numerical simulations.

EDUCATION

PhD in Atomic Physics

Laboratoire ICB (Dijon) - Institute for Physical Research (Ashtarak)

2021 - 2024 | Dijon, FR / Ashtarak, ARM

- Advisors: Prof. Claude LEROY (ICB), Prof. Aram PAPOYAN (IPR), Dr. Armen SARGSYAN (IPR).

Master in Physics, Photonics and Nanotechnologies

Université Bourgogne Franche-Comté

2019 - 2021 | Dijon, FR

- Research internship at IPR - Ashtarak, Armenia.
- 2nd year: 16.05/20 (major).
- TOEIC, score: 990/990 - C1.

Bachelor in Theoretical and Applied Physics

Université Bourgogne Franche-Comté

2016 - 2019 | Dijon, FR

- 1-month research project, ICB - Dijon, France.
- Grade: 13.253/20.

French Scientific Baccalaureate

Augustin Cournot high school

2013 - 2016 | Gray, FR

- Grade: 15.02/20
- European section (reinforced english)

PROFESSIONAL EXPERIENCE

Part-time lecturer

Université de Bourgogne

September 2021 - ongoing | Dijon, FR

- Supervision of Ray and Wave Optics lab sessions (2nd year of BSc. in Physics), Biophysics/Fluid mechanics lab sessions (2nd year of BSc. in Biology) and Physical measurements lab sessions (2nd year of BSc. in Biology).
- 64 hours of teaching each year.

Supervision of students

Université de Bourgogne

January 2022 | Dijon, FR

- Supervision (with Prof. Claude LEROY) of 3 students in 3rd year of BSc. in Physics during their micro-internship (TER). Subject: coupling of angular momenta and the Dirac equation in Quantum Mechanics.
- Supervision of middle school students during their mandatory internship "Séquence d'observation en milieu professionnel". General presentation of research, vulgarization in atomic and molecular physics.

Private teacher

at home / AFEV organization

2017 - 2021 | Dijon, FR

- 2018 - 2021: Private teacher of Maths, Physics and Chemistry for middle- and high-school student. Courses, methodology and vulgarization.
- 2017: Teaching sciences to struggling high-school students (mainly foreigners) for the AFEV organization.

STRENGTHS

Hardworking | Curious | Autonomous | Motivated | Dynamic | Rigorous

LANGUAGES

French	Native
English	Fluent
German	Intermediate
Russian	Beginner

SKILLS

- Linux, MacOS, scientific computing: MATLAB, GNU Octave, Wolfram Mathematica, Python, notions of Fortran
- Scientific writing: LaTeX, MS Office

HOBBIES

Music (played with several bands in the past few years): drums and bass guitar. Bow, biking, travelling, swimming.

SCIENTIFIC EXPERIENCE

- **2019**: Bachelor research project (1 month) *"Demonstration of the Dirac equation in Quantum Mechanics"* supervised by Prof. Claude LEROY, **grade: 17/20**.
- **2020**: Master 1 research project (4 months) *"Transition cancellations of Alkali atomic vapors in external magnetic fields"*, supervised by Prof. Claude LEROY and Artur ALEKSANYAN (PhD student ICB & IPR, Ashtarak, Armenia), **grade: 20/20**. Publication of two articles in peer-reviewed journals (Journal of Quantitative Spectroscopy and Radiative Transfer, Journal of the Optical Society of America B).
- **2021**: Master 2 research semester in Armenia: *"Behavior of hyperfine transitions of alkali vapors confined in nano-cells"*, supervised by Prof. Claude LEROY and Prof. Aram PAPOYAN (IPR). Publication of two articles in peer-reviewed journals (Journal of Quantitative Spectroscopy and Radiative Transfer, Journal of Experimental and Theoretical Physics)
- Reviewer for New Journal of Physics (IOP).

INTERNATIONAL PROJECTS

- 2021 - 2024 : Participation as a researcher to the NATO SPS G5794 "Development of Optical Magnetic Sensing Systems for Security Checkpoints" project - 295 k€. University of Latvia, Université de Bourgogne - France and Institute for Physical Research - Armenia.

PUBLICATIONS AND DISSEMINATION

Articles

- A. Sargsyan, R. Momier, C. Leroy, and D. Sarkisyan. "Influence of buffer gas on the formation of N-resonances in rubidium vapors" (2024). *submitted to Spectrochimica Acta Part B*.
- R. Momier, A. Sargsyan, A. Tonoyan, C. Leroy, and D. Sarkisyan. "Micrometric-Thin Cell Filled with Rb Vapor for High-Resolution Atomic Spectroscopy". *Opt. Mem. Neural Networks* 32.S3 (2023), S349–S355.
- A. Tonoyan, A. Sargsyan, R. Momier, C. Leroy, and D. Sarkisyan. "Formation of Narrow Atomic Lines of Rb in the UV Region Using a Magnetic Field". *Opt. Mem. Neural Networks* 32.S3 (2023), S343–S348.
- A. Sargsyan, R. Momier, C. Leroy, and D. Sarkisyan. "Competing van der Waals and dipole-dipole interactions in optical nanocells at thicknesses below 100 nm". *Phys. Lett. A* 483 (2023), p. 129069.
- A. Sargsyan, A. Tonoyan, R. Momier, C. Leroy, and D. Sarkisyan. "Formation of strongly shifted EIT resonances using "forbidden" transitions of Cesium". *J. Quant. Spectrosc. Radiat. Transf.* 303 (2023), p. 108582.
- A. Sargsyan, R. Momier, C. Leroy, and D. Sarkisyan. "Saturated absorption used in potassium microcells for magnetic field sensing". *Las. Phys.* 32 (2022), p. 105701.
- M. Auzinsh, A. Sargsyan, A. Tonoyan, C. Leroy, R. Momier, D. Sarkisyan, and A. Papoyan. "Wide range linear magnetometer based on a sub-microsized K vapor cell". *Appl. Opt.* 61.19 (2022), pp. 5749–5754.
- A. Aleksanyan, R. Momier, E. Gazazyan, A. Papoyan, and C. Leroy. "Cancellation of D_1 line transitions of alkali-metal atoms by magnetic-field values". *Phys. Rev. A* 105 (2022), p. 042810.
- A. Sargsyan, A. Tonoyan, R. Momier, C. Leroy, and D. Sarkisyan. "Dominant Magnetically Induced Transitions in alkali metal atoms with nuclear spin $3/2$". *J. Opt. Soc. Am. B* 39.4 (2022), pp. 973–978.
- R. Momier, A. V. Papoyan, and C. Leroy. "Sub-Doppler spectra of sodium D lines in a wide range of magnetic field: Theoretical study". *J. Quant. Spectrosc. Radiat. Transf.* 272 (2021), p. 107780.
- A. Sargsyan, R. Momier, A. Papoyan, and D. Sarkisyan. "Sub-Doppler spectroscopy in a 400 nm Cs atomic vapor column at room temperature". *J. Exp. Theor. Phys.* 133.4 (2021), pp. 404–410.
- A. Aleksanyan, R. Momier, E. Gazazyan, A. Papoyan, and C. Leroy. "Transition cancellations of 87Rb and 85Rb atoms in a magnetic field". *J. Opt. Soc. Am. B* 37.11 (2020), pp. 3504–3514.
- R. Momier, A. Aleksanyan, E. Gazazyan, A. Papoyan, and C. Leroy. "New standard magnetic field values determined by cancellations of 85Rb and 87Rb atomic vapors $5^2S_{1/2} \rightarrow 6^2P_{1/2,3/2}$ transitions". *J. Quant. Spectrosc. Radiat. Transf.* 257 (2020), p. 107371.

Seminars and conferences

- R. Momier, A. Sargsyan, A. Tonoyan, D. Sarkisyan, and C. Leroy. "Generation of forbidden EIT resonances with $\Delta F = +2$ transitions of Cs D_2 line". Oral presentation, International Conference Laser Physics 23 (LP2023), Ashtarak, Armenia (September 2023).
- R. Momier, A. Sargsyan, A. Tonoyan, M. Auzinsh, D. Sarkisyan, A. Papoyan, and C. Leroy. "Sub-Doppler spectroscopy of ^{39}K for magnetic field measurements". Poster presentation, High Resolution Molecular Spectroscopy Colloquium 2023 (HRMS 2023), Dijon, France (September 2023).

- R. Momier, A. Sargsyan, A. Tonoyan, D. Sarkisyan, and C. Leroy. “Formation of strongly shifted EIT resonances using ”forbidden” transitions of Cesium”. Poster presentation, High Resolution Molecular Spectroscopy Colloquium 2023 (HRMS 2023), Dijon, France (September 2023).
- R. Momier, A. Sargsyan, A. Tonoyan, D. Sarkisyan, and C. Leroy. “Formation of strongly shifted EIT resonances using ”forbidden” transitions of Cesium”. Poster presentation, XXIIè Journées de l’Ecole Doctorale Carnot-Pasteur, Dijon, France (June 30, 2023). **Best poster communication prize**.
- R. Momier, A. Sargsyan, A. Tonoyan, D. Sarkisyan, and C. Leroy. “Formation of strongly shifted EIT resonances using ”forbidden” transitions of Cesium”. Poster presentation, 54th Conference of the European Group on Atomic Systems (EGAS 54), Strasbourg, France (June 18-22, 2023).
- R. Momier, A. Sargsyan, A. Tonoyan, M. Auzinsh, D. Sarkisyan, A. Papoyan, and C. Leroy. “Sub-Doppler spectroscopy of ^{39}K for magnetic field measurements”. Poster presentation, 54th Conference of the European Group on Atomic Systems (EGAS 54), Strasbourg, France (June 18-22, 2023).
- A. Aleksanyan, R. Momier, E. Gazazyan, A. Papoyan, and C. Leroy. “Magnetic field values annihilating alkali atoms’ transitions”. Poster presentation, International Conference Laser Physics 22 (LP2022), Ashtarak, Armenia (September 14-16, 2022).
- R. Momier, A. Sargsyan, A. Tonoyan, M. Auzinsh, D. Sarkisyan, A. Papoyan, and C. Leroy. “Nanometric-Thin K Vapor Cell used as a Large-Range Magnetometer”. International Conference Laser Physics 22 (LP2022), Ashtarak, Armenia (September 14-16, 2022). **Best student presentation prize.**
- A. Aleksanyan, R. Momier, E. Gazazyan, A. Papoyan, and C. Leroy. “Magnetic field values cancelling alkali atoms’ transitions”. Poster presentation, 14th European Conference on Atoms, Molecules and Photons (ECAMP 14), Vilnius, Lithuania (June 27 - July 1, 2022).
- R. Momier, A. Aleksanyan, A. Sargsyan, A. Tonoyan, M. Auzinsh, D. Sarkisyan, A. Papoyan, and C. Leroy. “Magnetometry with a nanometric-thin K vapor cell”. **Invited speaker**, 14th European Conference on Atoms, Molecules and Photons (ECAMP 14), Vilnius, Lithuania (June 27 - July 1, 2022).
- A. Aleksanyan, R. Momier, E. Gazazyan, C. Leroy, and A. Papoyan. “Determination of the magnetic field values cancelling D_1 line transitions of alkali-metal atoms”. Internal seminar, Institute for Physical Research, NAS of Armenia (June 2, 2022).
- R. Momier, A. Papoyan, and C. Leroy. “Theoretical study of sodium D lines in a wide range of magnetic field with sub-Doppler resolution”. International Conference Laser Physics 21 (LP2021), Ashtarak, Armenia (September 21-24, 2021). **Second best student presentation prize.**
- A. Aleksanyan, R. Momier, E. Gazazyan, A. Papoyan, and C. Leroy. “Alkali atom transition cancellations within magnetic field”. 52nd Conference of the European Group on Atomic Systems (EGAS 52), Zagreb, Croatia (online, July 6-8, 2021).
- R. Momier, C. Leroy, and A. Papoyan. “Zeeman transitions of ^{23}Na in a external magnetic field”. Internal seminar, Institute for Physical Research, NAS of Armenia (April 16, 2021).
- R. Momier, A. Aleksanyan, E. Gazazyan, A. Papoyan, and C. Leroy. “B-field values cancellings $5S \rightarrow 6P$ transitions hyperfine of ^{85}Rb and ^{87}Rb”. International online seminar ICB-Institute for Physical Research, NAS of Armenia (May 7, 2020).

Last update: July 3, 2024