

Andrey Geondzhian | Theoretical physicist

25/02/1992

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EUROPEAN SYNCHROTRON

RADIATION FACILITY (ESRF)

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EDUCATION

PhD physics, (2019), Université Grenoble Alpes, Grenoble, France

MSc physics, (2015), National Research Nuclear University "MEPhI", Moscow, Russia

SKILLS AND EXPERTISE

- Scientific interests: **Excited state problems**, dynamical effects (phonons, plasmons), **electron and exciton-phonon** interactions, **quantum information**, theoretical spectroscopy
- **First-principle methods**: DFT (plane-waves, pseudo-potentials/all electron), DFT+U, TDDFT, DFTPT, MD
- Many-body Green's functions techniques: GW, **Cumulant**, BSE
- Machine Learning and Neural Networks
- Programming: **Python**, Fortran, Matlab, bash, C++, version control (GitLab, GitHub)
- Scientific packages: **QUANTUM ESPRESSO**, ABINIT, OCEAN, PHONOPY, VASP, WEIN2K
- Python libraries: Numpy, Scipy, scikit-learn, TensorFlow, **Qiskit**, **PennyLane**, Plotly/Dash, Dask
- Model approaches: Fröhlich, Holstein, Ising and Hubbard models, Multiplet calculations

EXPERIENCE

2019–2020 **Visiting Scientist**, Theory Group, ESRF - European Synchrotron Radiation Facility, Grenoble, France.

- Studied electron-lattice interaction in low dimensional systems (graphite, cuprates).
- Generalized analytically solvable models to obtain vibrational contribution in resonant inelastic X-ray scattering.
- Published an open-source package for spectroscopy's data analysis.

- 2015–2019 **Associate researcher (PhD student)**, Theory Group, ESRF - European Synchrotron Radiation Facility, Grenoble, France.
- Developed a new theoretical approach to treat dynamical contributions in resonant inelastic X-ray scattering based on many-body Green's functions technique and *ab initio* calculations.
 - Developed a framework to account many-body contributions using time-dependent molecular dynamics simulations in X-ray photo-emission and X-ray absorption spectroscopies.
 - Applied cumulant ansatz to an exciton-phonon problem.
 - Studied electron-lattice interaction in transition metal oxides (titanites, cuprates).
 - Participated in code development.
 - Managed several projects on the international level.
 - Guided master students.
 - Presented results at international conferences and wrote a Ph.D. thesis.
- 2013–2015 **Associate researcher (Master student)**, Condensed Matter department, NRNU 'MEPhI' National Research Nuclear University, Moscow, Russia.
- Numerically and experimentally studied pressure-induced electronic phase transitions in the materials with elements in the intermediate oxidation state.
 - Participated in national and international collaborations.

PUBLICATIONS

8. [A. Geondzhian](#) A. Sambri, G. M. De Luca, R. Di Capua, E. Di Gennaro, D. Betto, M. Rossi, Y. Y. Peng, R. Fumagalli, N. B. Brookes, L. Braicovich, K. Gilmore, G. Ghiringhelli, M. Salluzzo, Large polarons as key quasiparticles in SrTiO₃ and SrTiO₃-based heterostructures, *arXiv:2005.02054*, 2020
7. [A. Geondzhian](#) and K. Gilmore, Generalization of the Franck-Condon model for phonon excitations by resonant inelastic X-ray scattering, *Physical Review B* 101, 214307, 2020
6. [A. Geondzhian](#) and K. Gilmore, Demonstration of RIXS as a probe of exciton-phonon coupling, *Physical Review B* 98, 214305, 2018
5. A. P. Menushenkov, A. A. Yaroslavtsev, [A. Y. Geondzhian](#), R. V. Chernikov, L. Nataf, X. Tan, and M. Shatruk. Driving the europium valence state in EuCo₂As₂ by external and internal impact. *Journal of Superconductivity and Novel Magnetism*, 30(1):75–78, 2017

4. X. Tan, V. Ovidiu, P. Chai, A. Y. Geondzhian, A. Yaroslavtsev, Y. Xin, A. Menushenkov, R. Chernikov, and M. Shatruk. Synthesis, crystal structure, and magnetism of $A_2Co_{12}As_7$ ($A = Ca, Y, Ce - Yb$). *Journal of Solid State Chemistry*, 236:147–158, 2016
3. X. Tan, A. A. Yaroslavtsev, H. Cao, A. Y. Geondzhian, A. P. Menushenkov, R. V. Chernikov, L. Nataf, V. O. Garlea, and M. Shatruk. Controlling magnetic ordering in $Ca_{1-x}Eu_xCo_2As_2$ by chemical compression. *Chemistry of Materials*, 28(20):7459–7469, 2016
2. A. Y. Geondzhian, A. A. Yaroslavtsev, P. A. Alekseev, R. V. Chernikov, B. R. Gaynanov, F. Baudalet, L. Nataf, and A. P. Menushenkov. Pressure-induced electronic phase transition in compound $EuCu_2Ge_2$. *Journal of Physics: Conference Series*, 712(1):012112, 2016
1. A. P. Menushenkov, A. A. Yaroslavtsev, A. Y. Geondzhian, R. V. Chernikov, Y. V. Zubavichus, X. Tan, and M. Shatruk. Local electronic and crystal structure of magnetic RCO_2As_2 ($R = La, Ce, Pr, Eu$). *Journal of Superconductivity and Novel Magnetism*, 28(3):995–997, 2015

CONFERENCES AND SCHOOLS

- 2018 17th International Conference on X-ray Absorption Fine Structure, Krakow, Poland (poster),
Green's function approach to vibrational contributions in X-ray spectroscopy
- 2018 Workshop on Resonant Inelastic and Elastic X-ray Scattering meeting, Diamond Light Source, UK
(talk), *Implicit spectral function approach to vibrational contributions in RIXS*
- 2018 European Synchrotron Radiation Facility User Meeting, Grenoble, France (poster),
Vibrational contribution in RIXS using Green's approach
- 2017 14th ETSF Young Researchers' Meeting, Tarragona, Spain (talk),
Understanding electron-phonon coupling in RIXS measurements
- 2016 **EUSpec Winter School on core-level spectroscopies**, Ajdovscina, Slovenia
- 2016 European Synchrotron Radiation Facility User Meeting, Grenoble, France (talk),
Phonon contribution in RIXS: ab-initio
- 2015 16th International Conference on X-ray Absorption Fine Structure, Karlsruhe, Germany (poster),
Pressure induced electronic phase transition in $EuCu_2Ge_2$
- 2014 European XFEL User Meeting, Hamburg, Germany (poster)
Local electronic and crystal structure of magnetic RCO_2As_2 ($R = La, Ce, Pr, Eu$)
- 2014 **DESY summer school**, Hamburg, Germany,
Software development *X-ray tracing: XRT*

AWARDS AND SCHOLARSHIPS

2014-2015 Research achievements scholarship

2010-2012 University scholarship

2009 Presidential Grant

OTHER

2016-2018 Organizing committee member of a theory seminar

2011-2015 Private tutor, teacher in middle and high-school (math)

2010-2015 Teacher in summer schools on advanced physics and math

Languages: Russian, English (C), French (A)

REFERENCES

On request