

# STEFANO PAGGI

STEFANOPAGGI.COM | LINKEDIN | STEFANOPAGGI@YMAIL.COM

---

## WORK EXPERIENCE

- University of Toulouse**, Toulouse, France 2023-2026  
Ph.D., Physics (*in process of completion*)
- **Scientific Software Development:** Developed a high-performance Python and FORTRAN framework for simulating electron excitation spectra using advanced many-body methods (Green's functions, Dyson equations)
  - **Large-Scale Numerical Methods:** Engineered solutions for extreme-scale linear algebra problems (up to  $10^{11}$  matrix elements) using sparse representations and general subspace reduction
  - **Performance Optimization:** Optimized matrix construction and diagonalization pipelines, achieving significant performance gains in large-scale simulations
  - **High Performance computing:** Deployed and executed workloads on High Performance Computing (HPC) systems, enabling scalable simulations of multi-electron systems
  - **Numerical Stability & Accuracy:** Implemented numerically stable algorithms for extracting correlated excitation spectra, ensuring high accuracy for quantum systems
- Conference talks given in Toulouse, Paris, Denver

## EDUCATION

- Heidelberg University**, Heidelberg, Germany 2016-2023  
M.Sc., Condensed Matter Physics, 2023 (GPA: 3.8/4.0 (German scale: 1.2, High Distinction)) 2020-2023
- Applied the Quany package using Lua scripting and Wolfram Mathematica to study correlated electron excitations
  - Modeled a cerium impurity in a silicon environment using a single impurity Anderson model (SIAM)
  - Simulated temperature-dependent spectra via Boltzmann statistics and compared with experimental observations
  - Analyzed asymmetric  $f$ - $f$  excitation features, identifying weaker-than-expected temperature dependence
  - Focus: physical modeling, simulation workflows, and interpretation of computational results
- B.Sc., Physics, 2016 (German scale: 2.5, Good) 2016-2020
- Collaborated within an experimental physics group on the modeling and analysis of a  $^3\text{He}$  atomic beam spectrometer
  - Computed beam trajectories and scattering cross-sections, supporting the design and interpretation of experiments
  - Developed tools for wavelet scattering representations for signal characterization
- Relevant Coursework: Linear Algebra, Scientific Computing, Quantum Statistics, Numerical Methods, Advanced Mathematics for Physicists

## SKILLS

- **Computing:** Python (NumPy, SciPy, PySCF), Wolfram Mathematica, Lua, Java, FORTRAN, Git, emacs, L<sup>A</sup>T<sub>E</sub>X, Linux/Shell, High Performance Computing (Slurm)
- **Languages:** English (*full professional*), German (*native*), Italian (*native*), French (*elementary*)

## PUBLICATIONS

full-author in Physics Review B, Journal of Chemical Physics, and in preparation