

Several open positions are available in the Quantum Nanoscience Department of Peter Grünberg Institute at Forschungszentrum Jülich, in the Physics Department of the University of Regensburg, and in the Institute of Physics of the University of Graz. The positions are funded by the European Union through the ERC Synergy Grant “Photoemission Orbital Cinematography: An Ultrafast Wavefunction Lab.”

Directly watching in slow-motion videos how electrons move in quantum mechanical orbitals and how this motion shapes the functionalities of condensed matter has been a dream shared by all natural and life sciences. Based on synergies between photoemission orbital tomography, ultrafast photoelectron spectroscopy, lightwave electronics and advanced theory, the project “Orbital Cinema” will turn this dream into reality, by creating a cinematography at unprecedented time scales, faster than a single oscillation period of light. The model-free observation of orbital motion will carry us to the very foundations of quantum science and will revolutionize our understanding of the nanocosmos by elucidating – on elementary spatio-temporal scales – the inner structure of quantum leaps, strong-field control of electrons, charge transfer processes, and chemical reactions as well as their control by electric fields and light. Orbital Cinema will thus resolve key questions related to a wide range of applications, from next-generation optoelectronics, energy conversion, photochemistry and catalysis to prospective electronics at optical clock rates.

We are offering:

8 PhD and 4 Postdoc positions

We look for excellent candidates who are interested in experimental or theoretical work in the fields of ultrathin and highly ordered molecular films, light wave electronics, time-resolved two photon-photoemission, or time-dependent density functional theory.

Your primary tasks will be:

- Development and characterization of tailor-made materials for orbital cinematography at the **Sample Foundry in Jülich** (2 PhD and 1 Postdoc)
- Design and setup of a unique high-repetition-rate attosecond laser source or of a photoemission momentum microscopy system and first slow-motion **videography of molecular orbitals in Regensburg** (3 PhD and 2 Postdoc)
- Ab-initio electronic structure calculation within the framework of (time-dependent) **density functional theory and many-body perturbation theory in Graz** (3 PhD and 1 Postdoc)
- For Postdocs: Supervision of PhD students
- Preparation of scientific publications and presentations
- Participation in and presentation at conferences in Germany and abroad

Your profile:

- Master/PhD in Physics, Chemistry or Material Science with excellent grades
- High degree of independence and commitment
- Excellent communication skills
- Fluent written and spoken English
- Analytic problem-solving capabilities and creativity
- Reliable and thorough working style

From Postdocs we expect additionally:

Jülich – Experience in surface science (e.g., photoelectron spectroscopy or microscopy, electron diffraction, scanning probe microscopy). Experience with ultrathin molecular films is welcome but not strictly required.

Regensburg – Experience in one or more of the following fields: Ultrafast laser science and photonics, strong-field light-matter interaction, attosecond science, or surface science and photoelectron spectroscopy.

Graz – Experience in ground state as well as time-dependent density functional theory calculations and in the application of many-body perturbation theory approaches (GW and BSE).

Our offer:

- PhD and Postdoc projects at the leading edge of science
- An international, highly motivated and interdisciplinary team of experimentalists and theorists working at leading European Universities and Research Establishments
- Outstanding scientific and technical infrastructure
- Participation in a 11,3 Mio € ERC Synergy Project; ERC Synergy Projects are one of the most prestigious European research awards
- Continuous scientific mentoring by at least two scientific advisors
- Opportunities to build up your scientific network across Europe
- Initial 3 year contract

Applications in pdf format, including a personal cover letter, should be send by email to:

info@orbital-cinema.eu



European Research Council
Established by the European Commission



**Funded by
the European Union**