



research assistant

Reference number: WM FB Physik 955

Term limitation:
PhD 3J / PostDoc 2J

Beginning:
as soon as possible

Location:
Kaiserslautern

Scope:
To be discussed

Remuneration:
According to TV-L

Faculty:
Physics

With over 20,000 students, more than 300 professorships and around 160 degree programs, the University of Kaiserslautern-Landau (RPTU) is the technical university of the state of Rhineland-Palatinate. As a place of top international research, it offers excellent working conditions and career opportunities. Those who study, research or work at RPTU experience a cosmopolitan environment and shape the future.

Among quantitative multivariate molecular analysis techniques, broadband vibrational spectroscopies uniquely combine several advantages. They require minimal sample preparation, and the specific vibrational fingerprint signal is acquired very rapidly via optical interrogation, non-destructively and in a label-free manner. Recent progress in broadband, coherent sources of ultrashort mid-infrared (MIR) pulses and electric-field-resolved spectroscopy (FRS) has opened up a vast potential for new applications of vibrational fingerprinting to high-throughput classification of biological systems in their natural, aqueous state [1,2].

At the Laboratory of Lightwave Metrology you will join a dynamic, multi-disciplinary team, developing MIR-FRS technology toward the fundamental sensitivity and specificity limits, and seeking to extend this technology toward super-resolution, spatially-resolved, chemically-specific characterization of living cells and tissue. While deeply rooted in basic photonics research, these novel techniques promise to address unmet medical diagnostic needs, in particular in severe infections and sepsis and in the sensitive detection of circulating tumor cells.

The positions are funded by the recently awarded ERC Consolidator Grant "LIVE – Laser-Based Infrared Vibrational Electric-Field Fingerprinting" and the research will be carried out at our RPTU laboratories. Besides close synergies within the Laboratory of Lightwave Metrology, the frame of LIVE provides close collaborations with the Department of Anesthesiology and Intensive Care Medicine as well as the Institute for Clinical Chemistry and Laboratory Diagnostics, both at the Jena University Hospital.

See also lightwavelab.de

[1] I. Pupeza et al., "Field-resolved infrared spectroscopy of biological systems", *Nature* 577, 52 (2020).

[2] M. Huber et al., "Optimum sample thickness for trace analyte detection with field-resolved infrared spectroscopy," *Analytical Chemistry* 92, 7508–7514 (2020).

Your area of responsibility:

- Develop next-generation high-quantum-efficiency electro-optic-sampling-based FRS of MIR molecular fingerprints, using cutting-edge femtosecond laser technology and nonlinear optics.
- Develop high-throughput FRS-based sub-MIR-wavelength microscopy and tomography.

- Collaborate with the LIVE-partners toward real-world biomedical applications of the novel techniques, in particular real-time, spatially-resolved fingerprinting of the response of cells to pathogen and drug stimulation, as well as high-throughput, label-free phenotyping of large numbers of cells according to their infrared fingerprints.

Your requirements profile:

- Completed Master's degree (or equivalent) for PhD candidates, or completed doctorate for postdoc candidates, in Physics or Electrical Engineering.
- Experience with laser physics and nonlinear optics
- Enjoy interdisciplinary work with a focus on nonlinear optics, spectroscopy and microscopy
- Strong motivation, commitment and independence
- Very good written and spoken English

We offer:



Health promotion



Family Service Center



Vocational Training



Flexible working hour and home office



Jobticket



Retirement provision



Sport & Fitness programmes



Culture & Leisure offers



Local recreation in the Palatinate Forest

RPTU stands for diversity among all employees. We welcome applications from all interested parties, regardless of their ethnic and social origin, age, religion, gender, disability and sexual orientation or identity. Preference will be given to severely disabled persons and persons equivalent to them if they have the appropriate qualifications and suitability.

The RPTU aims to increase the proportion of women in areas where women are underrepresented.

Your application:

We look forward to receiving your detailed application (CV, references, etc.).

Please submit your application using the "Online Bewerbung" button below or via our application portal (<https://rptu.de/ueber-die-rptu/stellenangebote-und-karriere>).

Your contact person at Department 3 Human Resources is Ms. Schuff (Tel.: 0631 205 5957).

For technical questions, please contact Prof. Dr. Joachim Pupeza (Tel.: 0631 205 2315, e-mail: pupeza-office@rptu.de).

