TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

Photonics Institute, TU Wien
Gusshausstrasse 27
1040 Vienna
Austria

May 2022

THE ULTRAFAST LASER GROUP OF PHOTONICS INSTITUTE AT TU WIEN
INVITES APPLICATIONS FOR A

PhD Position: Generation and applications of THz burst pulses

The research pursued by the Ultrafast Laser Group of Photonics Institute, led by Andrius Baltuška, focuses on the generation of ultrashort intense laser pulses in the near- and mid-infrared wavelength range and applications of these pulses to frequency conversion into the THz (10^{12} Hertz) and extreme ultraviolet/X-ray ranges.

The successful candidate will experimentally work on the generation of THz bursts and their application to spectroscopy on molecules and molecular compounds. These THz bursts consist of several (up to 15) THz pulses delayed to each other by only a few picoseconds (10^{-12} seconds) and are generated by frequency down-conversion (optical rectification) of bursts of ultrashort, intense laser pulses with an identical number of pulses and pulse delay. A laser system that is capable of producing such bursts of laser pulses has been demonstrated recently by the Baltuska group, see Ref. [1].

The goal of the PhD project is to apply a laser system based on this technology to the generation of THz bursts, to characterize the properties of the THz bursts and, subsequently, to build an experimental setup that allows to perform linear spectroscopic measurements on molecules and molecular compounds with these THz bursts. In the long run this approach shall be extended to non-linear spectroscopy.

Further information about the institute and ongoing research projects can be found on the webpages of the institute http://www.photonik.tuwien.ac.at/ and the research group http://atto.photonik.tuwien.ac.at.

[1] V. Stummer et al., "Programmable generation of terahertz bursts in chirped-pulse laser amplification," Optica **7**, 1758 (2020); [http://dx.doi.org/10.1364/OPTICA.403184].

Requirements:

- Masters degree in Electrical Engineering or Physics
- Good knowledge of English
- Education in optics/photonics, lasers and quantum physics
- Skillful, enthusiastic, determined and capability to work independently
- Good social skills and ability to work in a team in an international environment (spoken German not required, but would be an asset)

Offer:

- Employment in the scope of a research project with the Austrian Science Fund (FWF)
- The starting salary, as fixed by FWF, is 2300 € per month before taxes (14 times a year)
- Full health and social insurance
- The position is available by June 1st, 2022

Applications consisting of a CV and a motivation letter should be sent by email to

Dr. Markus Zeiler, markus.zeiler@tuwien.ac.at

Prof. Dr. Andrius Baltuska, andrius.baltuska@tuwien.ac.at