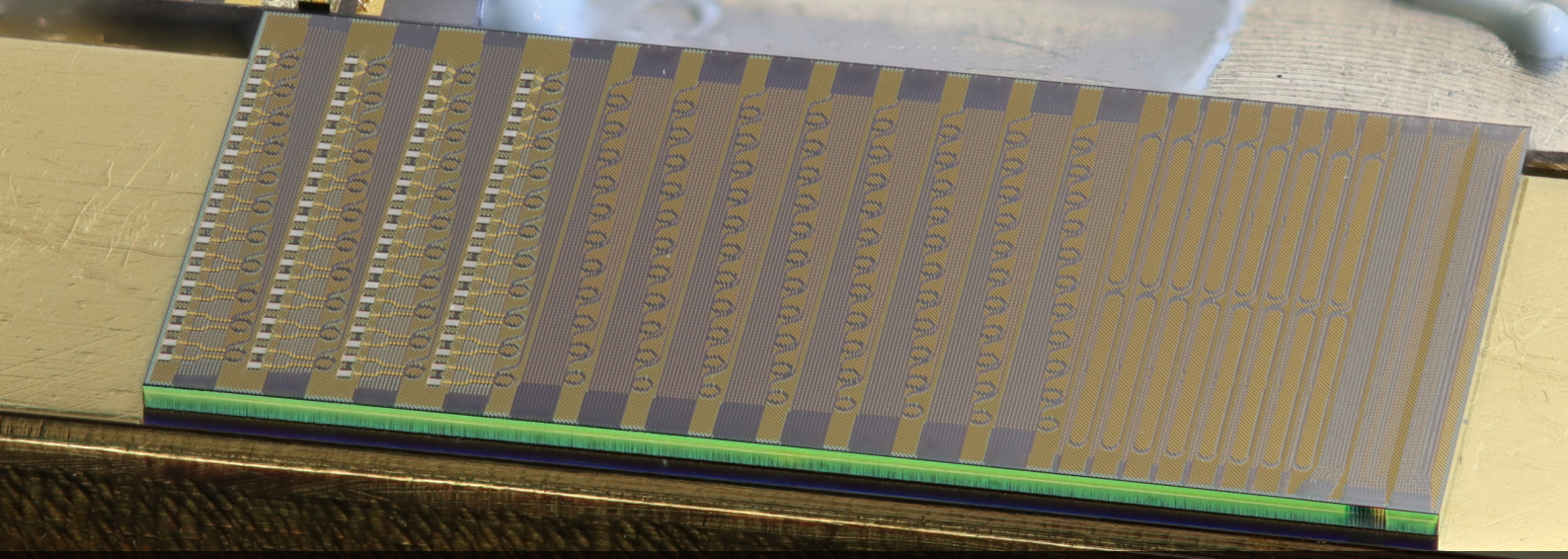
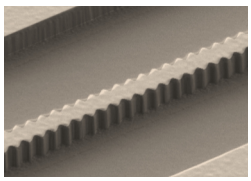
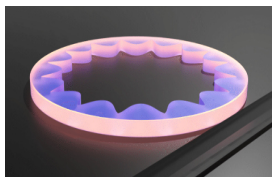
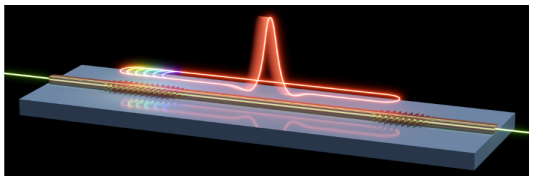


PhD/MSc Thesis

Nanophotonic ultrafast lasers sources







Are you interested or would you like more information? Please don't hesitate to get in touch.

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CFEL SCIENCE
Ultrafast Nonlinear Microphotonics

About the project

Femtosecond lasers are a key enabling technology. They have applications ranging from biomedical imaging, environmental sensing and optical spectroscopy to precision measurements in astronomy and cosmology.

In this project, we aim at developing novel femtosecond laser sources, that are integrated on "photonic chips"[1,2,3]. Advanced nano-geometries[4,5] will allow us to explore and unlock the potential of pulses with the duration of only a few optical cycles, produced with record-high repetition rate for novel an emerging applications. Currently, we are working on developing sources specifically for astronomical precision spectroscopy, supporting searches for Earth-like planets and 'real-time' measurements of the cosmological expansion. However, other opportunities that could be explored in the context of this project exist. They include optical spectroscopy for environmental or biological sensing, energy-efficient optical computing or boosting the speed of optical data links for the internet.

The **PhD thesis** will combine experimental, numerical, and analytical techniques at the forefront of integrated photonic technology, ultrafast lasers and nonlinear optics. It includes the design of integrated photonic circuits and advanced microphotonic laser systems as well as experiments in our state-of-the-art laboratory (https://ump.cfel.de/). The **MSc thesis** will focus on one of these aspects.

If you like working collaboratively with a highly motivated team in a fast-paced research field at the interface of fundamental science and applied photonic technology, please don't hesitate to get in touch. Curiosity and general understanding of physics are more important than field-specific prior knowledge.

References:

[1] Gaeta et al., *Nature Photonics* 13, 3, 158 (2019)
[2] Herr et al., *Nature Photonics* 8, 145 (2014)
[3] Brasch et al., *Science* 351, 6271 (2016)
[4] Wildi et al., *Optica* 10, 6, 650 (2023)
[5] Ullanov et al., https://arxiv.org/abs/2301.13132 (2023)

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