MASTER THESIS

GROUP FOR LASER ION ACCELERATION

Our group is working at Centre for Advanced Laser Applications (CALA), which will hosts one of the most powerful lasers in the world at the Forschungszentrum in Garching. To support our experimental team, in the development and operation of a unique Target system for isolated micro-spheres, we are currently looking for a talented and motivated

Master Student

The Paultrap Target system offers the unique possibility to position micron sized spheres in the micron size focus of a high power laser. Currently the system is installed at the ZEUS laser, to perform pump-probe experiments from micron-size plastic spheres. Soon the target system will be implemented in the LION experimental area at the Petawatt class ATLAS 3000 laser. These projects offer the opportunity for multiple Master Theses:

- **Micro-Anode from Gold spheres at the ZEUS laser:** In the framework of your thesis, you will first get to know and learn how to operate our unique system for levitating, fully isolated spheres. You will use the Paultrap system, which is installed at the ZEUS laser, to generate beams from gold spheres. In the scope of this thesis you will gain experience operating a high power laser system, designing and evaluating ion and X-Ray diagnostics and insights into electronical and optical systems.

- **Implementation of online particle diagnostics:** Overlapping a micron sized sphere with a micron sized focus is a huge challenge, which currently limits the repetition rate of the experiments to 1 laser shot approximately every 10 minutes. Your task would be to implement online diagnostics of the particle position and size using a second, weaker probe beam. Additionally you will participate in the experimental campaigns at the ATLAS 3000 laser.

Laser-driven Ion Acceleration (LION)

LION has been an emerging research field since its first observation in 2000. We use ultrashort high-power lasers, applying technology awarded with the 2018 Nobel Prize in Physics. Focused on solid density targets, highly energetic ion are emerging the plasma. Beams from this source feature unique beam properties that will drive manifold applications in medical physics and elsewhere.

Isolated Microspheres

We use a linear Paul trap to precisely position microspheres in the micrometer-sized focus of a high power laser. The full positional control over fully isolated targets is unique in the laser plasma community and enables detailed studies on the laser matter interaction.

http://goo.gl/dq8Snr , http://tiny.cc/a46vtz
www.cala-laser.de , https://www.pulse.physik.uni-muenchen.de/

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- **Design and setup of diagnostics for protons with energies in the excess of 100 MeV:** Our typical iWASP spectrometers are designed to detect protons that are not exceeding particle energies of 60 MeV. For these type of spectrometers, the energy resolution decreases with increased particle energy, which makes it harder for these particles to be detected reliably. Your scope would be to design a spectrometer, and also evaluate other diagnostic methods to reliably detect protons in the excess of 100 MeV. These diagnostics will then be implemented in the LION cave to support Laser-Ion-Acceleration experiments using the Paultrap as a target system. Additionally you will participate in the experimental campaigns at the ATLAS 3000 laser.

For all projects basic knowledge of laser-plasma interactions is beneficial, but not mandatory. Programming in Python will be necessary for the work. Enjoyment of experimental work and great motivation are major prerequisites.

If we caught your attention, we would be happy to receive your application including your transcript of records and CV to the email address below. You are always welcome to visit us in Garching for a lab tour and a chat in person.

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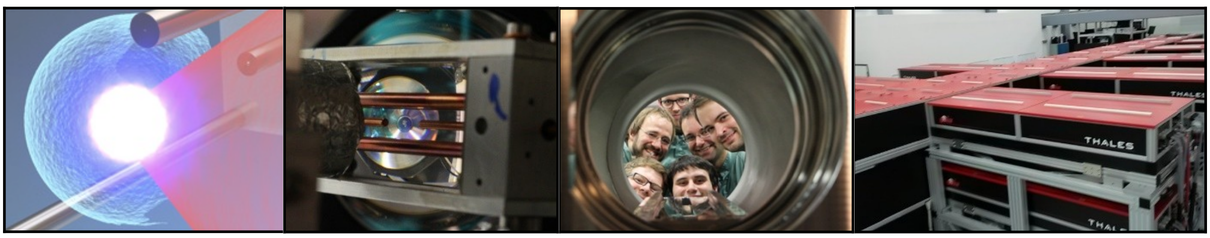

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