MASTER THESIS

CENTRE FOR ADVANCED LASER APPLICATIONS / HIGH FIELDS (Garching)

Detection and Characterization of Nuclear Fission Products from Laser-Driven Reactions

To strengthen our experimental team at the Centre for Advanced Laser Applications (CALA) at the Forschungszentrum Garching near Munich we are currently looking for a talented and motivated

Master Student

In the framework of your thesis, you will be responsible for:

- Improving the existing setup for laser-driven heavy ion acceleration
- Development of a novel detector system for identifying fission products resulting from the interaction of accelerated particles with stationary target nuclei
- Hands-on experience with a High-Purity Germanium (HPGe) detector as key component for high-resolution gamma spectroscopy
- Testing the developed setup in laser ion acceleration experiments at the ATLAS-3000 laser as part of the thesis

Furthermore, you will be given the chance to participate in beamtimes, getting hands-on experience in operating the experimental device controls and diagnostics.

Vivid interest in laser particle acceleration, nuclear physics, laser physics and optics is beneficial. Knowledge in programming with Python is desirable. Enjoyment of experimental work is major prerequisite.

If we caught your attention, we would be happy to receive your application including a short cover letter, your transcript of records and your CV to the email address listed below. You are always very welcome to visit us in Garching for a lab tour. We are excited to meet you!

Contact Data:

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CALA

The Centre for Advanced Laser Applications is home to one of the world's most powerful laser systems, the ATLAS-3000 laser, with a maximum power of up to 2,5 PW, delivered in ultra-short pulses of 25 fs.

Laser-driven Heavy Ion Acceleration

Laser-driven ion acceleration has been an emerging research field since its first realization about two decades ago. The ion bunches, accelerated by the interaction of ultra-intense laser pulses with plasmas, exhibit unique features, promising applications in various fields of physics.

Our group aims at the development of laser-driven bunches of *heavy* ions – such as gold, lead, thorium - as preparation for a novel reaction mechanism ('fission-fusion'). This approach aims to produce extremely neutron-rich isotopes relevant to nuclear astrophysics.

As an intermediate step, we are currently working with gold targets as a proxy for thorium due to radiation safety concerns. Key for to the successful acceleration of heavy ions is preheating the target foil. This process removes contaminants present on the surface of the foil, ensuring efficient conversion of the laser energy into the target material and enhancing the yield of the desired ion species.