

Master Theses in Electrical Engineering

Ultrafast TI-LGAD-based array detector for photon science applications

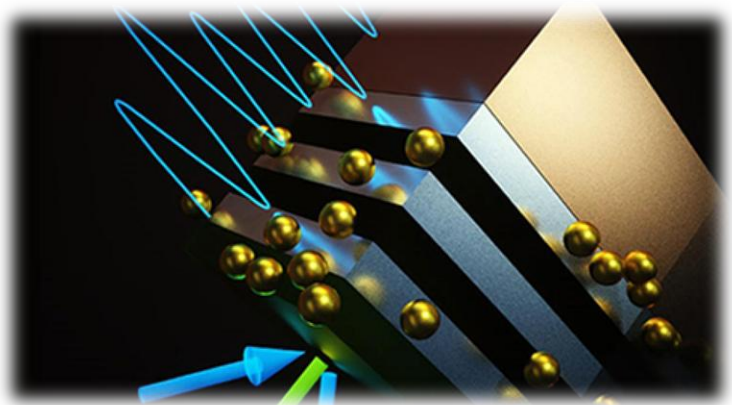
Thesis description:

Description:

Trench-Isolated Low-Gain Avalanche Diodes (TI-LGADs) represent a cutting-edge detector technology enabling ultrafast timing and high spatial resolution measurements. These devices are revolutionizing fields such as high-energy physics, photon science, beam diagnostics, and advanced accelerator instrumentation. In photon science, techniques like nuclear resonant scattering and time-resolved X-ray experiments could achieve an unprecedented level of precision through detectors based on TI-LGAD technology. Ongoing developments at KIT have already led to the design and successful fabrication of the first single-sensor prototype.

Thesis Objective:

Design and develop a high-performance printed circuit board (PCB) to integrate and manage up to four TI-LGAD detector systems simultaneously. This includes fast signal readout, synchronization, and data acquisition optimized for sub-nanosecond timing. The student will also participate in the first tests and characterization experiments with the new detector systems. The thesis will include hands-on testing at the KIT Light Source, as well as advanced experiments at PETRA III (DESY, Hamburg) and ESRF (Grenoble). This provides a unique opportunity to participate in real photon-science experiments with state-of-the-art detectors.



The student will gain practical experience in ultrafast detector electronics and advanced PCB design, as well as exposure to international photon science experiments.

If you are passionate about detector physics, electronics design, and photon science, this thesis offers a unique opportunity to combine all these areas in a single, high-impact project.

Duration: minimum 6 months, starting date: soon

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