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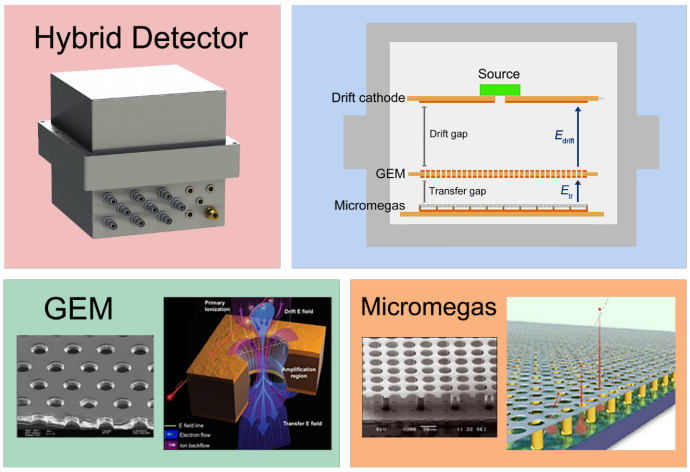
TECHNISCHE UNIVERSITÄT DARMSTADT

Bachelor thesis in Experimental Nuclear Physics
Building and characterising a hybrid gaseous particle detector

Micropattern gas detectors (MPGD) are a type of particle detector used in many large high energy physics experiments (Atlas, CMS, ALICE). MPGDs work by amplifying the signals generated by charged particles traversing a gas volume. This is made possible by using amplification structures with micrometer-scale patterns. There are different designs of such detectors, which include Gas Electron Multiplier (GEM) and Micro-Mesh Gaseous Structure (Micromegas). These are both highly scalable and offer good performance on their own but by combining both designs in a hybrid detector, the performance can be pushed even further. The Hydra (Hypernuclei Decay R3B Apparatus) TPC project in GSI uses a hybrid Micromegas+GEM detector to study the mesonic decay of hypernuclei into nuclei and pions.



In the scope of this thesis project, the building and characterization of a prototype Micromegas+GEM detector will be conducted. For this task, a new setup will be built, and performance tests will be conducted looking at the achievable signal amplification, energy & spatial resolution, and ion back flow suppression. For the latter, the studies will be performed in various gases, including a special mixture of Ar, isobutane and CF4. The results obtained from this research and development effort will be used for the final design of the Hydra TPC detector.

Interested candidates should contact Dr. Piotr Gasik, P.Gasik@gsi.de, or Prof. Alexandre Obertelli, aobertelli@ikp.tu-darmstadt.de.