

Seminar: "The RD51 Collaboration -
Development of Micro-Pattern Gas Detectors Technologies"

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Modern photolithographic technology has enabled a series of inventions of novel Micro-Pattern Gas Detectors (MPGD), in particular the Gas Electron Multiplier (GEM), the Micro-Mesh Gaseous Structure (Micromegas), and other micro pattern devices, which offers the potential to develop new gaseous detectors with unprecedented spatial resolution, high rate capability, large sensitive area, operational stability and radiation hardness. In some applications, requiring very large-area coverage with moderate spatial resolutions, more coarse Macro-patterned detectors, e.g. Thick-GEMs (THGEM) or patterned resistive-plate devices could offer an interesting and economic solution. The design of the new micro-pattern devices appears suitable for industrial production. In addition, the availability of highly integrated amplification and readout electronics allows for the design of gas-detector systems with channel densities comparable to that of silicon detectors. Modern wafer post-processing allows for the integration of gas-amplification structures directly on top of a pixelized CMOS readout chip. Thanks to these recent developments, particle detection through the *ionization of gas* has large fields of application in future particle, nuclear and astro-particle physics experiments with and without accelerators.

Recently, the RD51 collaboration has been founded to advance technological development of the large area MPGDs and associated electronic-readout systems, for applications in basic and applied research. This talk will highlight main achievements in the field of micro-pattern gas detectors and review common projects under development in the framework of the RD51 collaboration.