

Gaseous detectors for nuclear and particle physics: Fundamentals and beyond

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Progress in micro-fabrication technology has facilitated the development of gaseous radiation detectors capable of economically covering large detection volumes with a low material budget. Besides their widespread use in particle-physics and nuclear-physics experiments, gaseous detectors are employed in many other fields: astro-particle research and applications. The invention of Micro-Pattern Gas Detectors (MPGD), in particular the Gas Electron Multiplier (GEM), the Micro-Mesh Gaseous Structure (Micromegas), and more recently other micro pattern detector schemes,

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offers the potential to develop new gaseous detectors. With unprecedented spatial resolution, high rate capability, large sensitive area, operational stability and radiation hardness they find applications for nuclear and particle physics, and some societal applications such as medical imaging, material science, and homeland security. In this talk, I will share my experience on building a brand new project with MPGDs for the Compact Muon Solenoid (CMS) Upgrade and present some future possible projects.