PHYSICS SEMINAR

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"Overview of Micro Pattern Gas Detectors and Applications to Particle Physics and beyond"

Abstract

Multi wire proportional chambers (MWPCs) and drift chambers (DCs) have played a pivotal role as gaseous tracking detectors for particle physics experiments for over several decades. More recently, advances in photolithography and micro processing techniques have allowed the transition from wire-based gaseous detectors to a new generation known as Micro Pattern Gaseous Detectors (MPGDs) such as Gas Electron Multipliers (GEMs), Thick GEMs (THGEMs), Micro Mesh Gaseous Structures (Micromegas) and Micro Resistive Well Detectors (μRWELLs) for application in tracking, particle identification and calorimetry in various fields of particle physics experiments. These technologies usually combine gas amplification principle with micro□structure printed circuits technologies to provide high-rate, high spatial and time resolution, radiation-hard and low-mass detectors. In addition, recent technical breakthroughs have enabled large area capabilities, making MPGD technologies both high-performance and cost-effective options for current and future experiments in nuclear and high energy physics. In this presentation, I will give an overview of the state of the art of MPGDs technologies and present the range of applications in the field of particle physics as well as outside the particle physics field. I will specifically focus on the need for MPGDs at Jefferson Lab and for the future Electron Ion Collider (EIC). Finally, I will introduce the RD51 collaboration, is a CERN-based international collaboration dedicated to the development and advancement of the MPGDs technologies for application in current and future large-scale particle physics experiments.

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