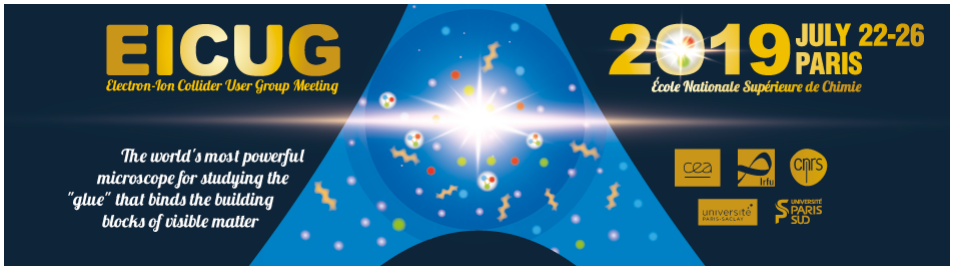

ID de Contribution: **41** Type: **Poster**

Development of Ultra-Fast Silicon Detectors (UFSDs) for precision timing measurements using TOPSiDE at the EIC

jeudi 25 juillet 2019 12:30 (15 minutes)

The Electron-Ion Collider, with its physics goals of studying in detail perturbative and non-perturbative QCD, requires a complete acceptance detector with high precision tracking, good vertex resolution, and excellent particle identification. The Timing Optimized PID Silicon Detector for the EIC (TOPSiDE) is a proposed concept of such a detector. In the barrel region, it is mainly divided into three parts, a silicon pixel vertex detector, a silicon strip tracker, and an imaging calorimeter concentrically assembled inside the superconducting solenoid. In the forward (backward) region it is supplemented by a Ring Imaging Cherenkov detector (High-resolution Crystal calorimeter). TOPSiDE provides five-dimensional information (energy, position, and time) using the tracker and calorimeter for particle identification by measuring the time-of-flight of charged particles. To cover the entire momentum range (up to 10 GeV/c) for most of the solid angle requires a time resolution of around 10ps.

To achieve this time resolution, TOPSiDE uses so-called Ultra-Fast Silicon Detectors (UFSD) based on the Low-Gain Avalanche Detector (LGAD) technology. To date time resolutions of 18 ps have been achieved. To further improve the timing measurement, we plan to integrate the sensor and electronics on the same wafer using the HVCMOS technology. We will present our progress in this respect, i.e., the results from the simulation of LGAD silicon sensor using Silvaco TCAD tools, the design of a PCB based readout electronic system, and the characterization and testing of LGAD silicon sensors both on the bench and in particle beams.

Auteurs principaux: REPOND, Jose (Argonne National Laboratory); JADHAV, Manoj Bhanudas (Argonne National Laboratory); Dr SHIN, Taylor (Argonne National Laboratory); Dr JOHNSTON, Sereres (Argonne National Laboratory); Dr METCALFE, Jessica (Argonne National Laboratory); CHEKANOV, Sergei (Argonne National Laboratory)

Orateur: JADHAV, Manoj Bhanudas (Argonne National Laboratory)

Classification de Session: Parallel session A

Classification de thématique: Detector R&D