Contribution ID: **12** Type: **not specified**

Development and Test of a 3D Diamond Detectors for Ionizing Radiation

Wednesday, July 3, 2013 4:25 PM (25 minutes)

We report on the fabrication, electrical characterization and particle detection performance of the first prototype of a 3D diamond detector for applications in particle physics. The 3D detector geometry has the advantage of small carrier drift paths, which allows in diamond for nearly full charge collection after large doses of radiation. Polycrystalline and single-crystal CVD diamond samples have been processed wit a femto-second laser to create arrays of conductive micro-channels with a diameter of a few microns. In our implementation of the 3D geometry the drift paths are of the order of 100um compared to conventional planar detector drift path of 500um. The properties of the graphitic columns have been characterized by optical and electrical methods. To answer the question whether such devices perform as well as conventional planar diamond detectors a complete prototype single-crystal 3D diamond detector with multi-channel charge integrating read-out has been tested with minimum ionizing radiation in a test beam at CERN.
The results from the 3D prototype are compared to a planar electrode configuration on the same diamond sensor. We observed that the 3D configuration collects the same amount of charge as the planar operated with much smaller bias voltage.

Primary author: Mr BACHMAIR, Felix (ETH Zürich)

Presenter: Mr BACHMAIR, Felix (ETH Zürich)