

Development of the BCM' system for beam abort and luminosity monitoring in ATLAS based on a segmented polycrystalline CVD diamond system and dedicated front-end ASIC

Wednesday 6 December 2023 09:00 (20 minutes)

The High Luminosity upgrade of Large Hadron Collider (HL-LHC) will increase the LHC Luminosity and with it the density of particles on the detector by an order of magnitude. For protecting the inner silicon detectors of the ATLAS experiment and for monitoring the delivered luminosity, a radiation hard beam monitor has been developed. We developed a set of detectors based on polycrystalline Chemical Vapor Deposition (pCVD) diamonds and a new dedicated rad-hard front-end ASIC. Due to the large range of particle flux through the detector, flexibility is very important. To satisfy the requirements imposed by the HL-LHC, our solution is based on segmenting diamond sensors into devices of varying size and reading them out with new multichannel readout ASICs divided into two independent parts - each of them serving one of the tasks of the system. In this talk we describe the system design including detectors, electronics, mechanics and services and present preliminary results from the most recent detectors fabricated using our prototype ASIC with data from beam tests at CERN.

Submission declaration

Original and unpublished

Primary authors: GORISEK, Andrej (Jozef Stefan Institute (SI)); KAGAN, Harris (Ohio State University (US)); Prof. MIKUZ, Marko (Jozef Stefan Institute (SI))

Co-authors: ONUFRENA, Aleksandra (CERN); OH, Alexander (University of Manchester (GB)); PORTER, Alice Laura (University of Manchester (GB)); SWOBODA, Anna (Fachhochschule Wiener Neustadt (AT)); SELHOFER, Bernhard (Fachhochschule Wiener Neustadt); HITI, Bojan (Jozef Stefan Institute (SI)); MACEK, Bostjan (Jozef Stefan Institute (SI)); SOLANS SANCHEZ, Carlos (CERN); SMITH, Dale Shane (Ohio State University (US)); FORMENTI, Fabio (CERN); FRAIS-KOELBL, Helmut (Fachhochschule Wiener Neustadt (AT)); ASENSI TORTAJADA, Ignacio (CERN); SIRAL, Ismet (CERN); VEALE, Kirsty Lynn (Brandeis University (US)); MALLI, Miha (Jozef Stefan Institute (SI)); ABUSAREYA, Mo'men (Ohio State University)

Presenter: GORISEK, Andrej (Jozef Stefan Institute (SI))

Session Classification: Day 3 - Session 1

Track Classification: Radiation damage and radiation tolerant materials