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

Position reconstruction using machine learning algorithms applied to Resistive Silicon Detectors (RSD)

Thursday 4 June 2020 15:00 (20 minutes)

RSDs (Resistive AC-Coupled Silicon Detectors) are n-in-p silicon sensors based on LGAD (Low-Gain Avalanche Diode) technology, featuring a continuous gain layer over the whole sensor area. The innovative feature of these sensors is that the signal induced by an ionizing particle spreads among several pixels, allowing position reconstruction techniques that combine the information of many read-out channels.
In this contribution, the first application of a machine learning technique to RSD devices is presented: using inputs from 3 or 4 pads, a Multi-Output regressor algorithm is trained and validated using laboratory data taken with a Transient Current Technique (TCT) setup; then it is applied to beam test data. RSD matrices having different pitch and pixel sizes have been tested, in order to assess the algorithm performances with different geometries.
As an example, an RSD with 200 μm pixel provided 5 μm position resolution, 10 times better than what is achievable with binary read-out (200μm / sqrt(12) ˜ 55μm).

Author: SIVIERO, Federico (Universita e INFN Torino (IT))

Co-authors: ARCIDIACONO, Roberta (Universita e INFN Torino (IT)); CARTIGLIA, Nicolo (INFN Torino (IT)); COSTA, marco (University of Torino); FERRERO, Marco (Universita e INFN Torino (IT)); MANDURRINO, Marco (INFN); SOLA, Valentina (Universita e INFN Torino (IT)); STAIANO, Amedeo (Universita e INFN Torino (IT)); TORNAGO, Marta (Universita e INFN Torino (IT)); APRESYAN, Artur (Fermi National Accelerator Lab. (US)); HELLER, Ryan (Fermi National Accelerator Lab. (US)); DI PETRILLO, Karri Folan (Fermi National Accelerator Lab. (US)); LOS, Serguei (Fermi National Accelerator Laboratory (FNAL)); BORGHI, Giacomo (Fondazione Bruno Kessler); BOSCARDIN, Maurizio (FBK Trento); DALLA BETTA, Gian-Franco (INFN and University of Trento); FICORELLA, Francesco (Fondazione Bruno Kessler and INFN Trento); PANCHERI, Lucio (University of Trento); PATERNOSTER, Giovanni (Fondazione Bruno KEssler); CENTIS VIGNALI, Matteo (FBK)

Presenter: SIVIERO, Federico (Universita e INFN Torino (IT))

Session Classification: LGAD