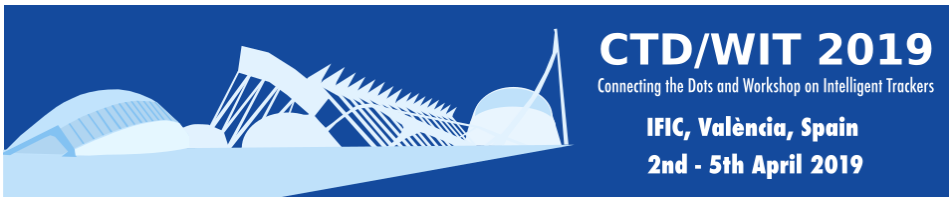

Contribution ID: **12** Type: **Talk**

Randomized Computer Vision Approaches for Pattern Recognition in Timepix and Timepix3 Detectors

Thursday, April 4, 2019 9:00 AM (25 minutes)

Timepix and Timepix3 Detectors are 256x256 hybrid active pixel detectors, capable of tracking ionizing particles as isolated clusters of pixels. To efficiently analyze such clusters at potentially high rates, we introduce multiple randomized pattern recognition algorithms inspired by computer vision. Offering desirable probabilistic bounds on accuracy and complexity, the presented methods are well-suited for use in real-time applications, and some may even be modified to tackle trans-dimensional problems. In older Timepix detectors which do not support data-driven acquisition, they have been shown to correctly separate clusters of overlapping tracks. In modern Timepix3 detectors, simultaneous acquisition of ToA+ToT pixel data enables reconstruction of the depth coordinate, transitioning from 2D to 3D point clouds. The presented algorithms have been tested on simulated inputs, test beam data from the Heidelberg Ion therapy Center and the Super-Proton-Synchrotron and were applied to data acquired in the MoEDAL and ATLAS experiments at CERN.

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Track Classification: 2: Real-time pattern recognition, fast tracking and performance evaluation