Canadian Association of Physicists
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Contribution ID: **3180** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Relative luminosity measurement and long-term stability studies with ATLAS-TPX network during LHC Run-2.

Monday, 6 June 2022 13:45 (15 minutes)

ATLAS-TPX network is a network of 15 pixelated detectors based on Timepix ASICs which was installed in ATLAS cavern to measure the Radiation Field composition and Luminosity during Run 2 in the framework of a collaboration between Montreal University and IEAP Czech Technical University in Prague. The Timepix silicon detectors are two-layered and equipped with neutron converters (Lithium Floride and Polyethylene). Thanks to the two operation modes available in Timepix ASICs i-e Time over Threshold (ToT) and Time of Arrival (ToA), each detector in the network is capable of measuring Luminosity with 5 different algorithms namely Cluster Counting Algorithm, Hit Counting Algorithm, Total Deposited Energy Algorithm, Thermal Neutron Counting Algorithm and MIPs (Minimum Ionizing Particles) Counting Algorithm. In addition to measuring the number of proton-proton collisions at the Interaction Point, finely segmented detectors (55um Pitch) allow a high-quality track reconstruction which helps to identify the particle types. Timepix Detectors network provide about 150 relative Luminosity measurements for each ATLAS Run. These measurements are then further analyzed to select the measurements with highest precision.

Different algorithms that were developed for Luminosity measurement were tested by comparing the Integrated Luminosity measurements with other ATLAS Luminosity detectors. Most algorithms show good agreement with other ATLAS Luminometers, while some algorithms showed slight disagreements which opened the door for crucial studies like track overlapping correction and Activation measurement in ATLAS cavern. Each algorithm comes with its statistical and systematic uncertainties. We have conducted Long Term stability studies with the ATLAS-Timepix network for the complete Run-2. We propose to present results from the different Luminosity measurement algorithms and Long-Term Stability studies for the year 2016, 2017 and 2018 with ATLAS-Timepix network.

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