## First Pan-African Astro-Particle and Collider Physics Workshop



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## Measurements of W boson properties at $\sqrt{s}$ = 5 and 13 TeV with the ATLAS detector at the LHC.

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After the discovery of the W and Z bosons at the Super Proton Synchrotron (SPS) at CERN, particles responsible for weak interactions, the efforts have been geared towards measuring their properties. A precise measurement of the W boson properties remains a major test for the validation of the standard model.

In this presentation, the measurement of the W boson transverse momentum  $p_W^T$  and the differential cross sections are described. Using low pile-up data set, collected with low number of interactions per bunch crossing, by the ATLAS detector in 2017 and 2018.

- Measurement of the transverse momentum distribution: One of the most important theoretical sources of uncertainties in the measurement of the W-boson mass, is the extrapolation of the  $p^T$  distribution from Z boson to W-boson ( $\approx 6$  MeV), a direct measurement of  $p_W^T$  would avoid such an extrapolation and the corresponding theoretical modelling uncertainty.
- Measurement of the differential cross sections: The measurement of the differential cross sections for the *W* boson provides stringent tests of the QCD theory, and is crucial for a deep understanding and modelling of QCD interactions. Also, the rapidity dependence of the W boson production in the Drell–Yan process provides constraints on the parton distribution functions (PDFs), which are currently the dominant uncertainty source in the W mass measurement (9.2 MeV).

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