Contribution submission to the conference Erlangen 2026

Measurement of $t\bar{t}$ spin correlations using Run 2 and 3 data with the ATLAS detector — Diptaparna Biswas, Carolina Costa, Markus Cristinziani, Carmen Diez Pardos, Ivor Fleck, Gabriel Gomes, Jan Joachim Hahn, •Nikolaos Kamaras, Vadim Kostyukhin, Nils Benedikt Krengel, Austin Olson, Inês Pinto, Sebastian Rentschler, Elisabeth Schopf, Katharina Voss, Wolfgang Walkowiak, and Adam Warnerbring — Experimentelle Teilchenphysik, Center for Particle Physics Siegen, Universität Siegen

The top quark is the heaviest known elementary particle and decays before hadronization. Consequently, measurements of the angular distributions of top quark decay products provide direct access to the top quark's spin, enabling a precise test of perturbative Quantum Chromodynamics in top-antitop quark pair ($t\bar{t}$) production. This contribution presents studies towards the measurement of $t\bar{t}$ spin correlations using the Run 2 and Run 3 datasets collected with the ATLAS detector from proton-proton collisions at a centre-of-mass energy of 13 TeV and 13.6 TeV, respectively. The analysis focuses on the dilepton decay channel, requiring two leptons of opposite charge (electrons or muons) and at least two jets, with at least two identified as originating from a b-quark. To reconstruct the top quark kinematics and subsequently the angular distributions of the decay products, several top reconstruction methods are employed. The $t\bar{t}$ spin correlation coefficients will be extracted from these angular distributions using a standard profile likelihood fit for unfolding to both parton and particle level.

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