Contribution submission to the conference Erlangen 2026

First measurement of the CKM matrix element $|V_{cb}|$ in $t\bar{t}$ decays 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 CKM matrix element $|V_{cb}|$ is one of the free parameters of the Standard Model. Until now, all determinations of $|V_{cb}|$ have relied on B-hadron decays, using either inclusive measurements, which include all possible final states, or exclusive measurements that focus on specific decay channels. Between these methods, a tension of about 3σ is observed. However, $|V_{cb}|$ can also be determined from on-shell W boson decays, as the branching ratio of $W \to cb$ is proportional to $|V_{cb}|^2$. This talk presents the first ATLAS measurement to determine $|V_{cb}|$ from hadronic W boson decays in $t\bar{t}$ production, targeting events in which one W boson decays leptonically and the other hadronically. The talk will cover the data analysis strategy, including the multivariate classifier used to separate signal from background and the use of flavour tagging, along with the dominant systematic uncertainties. The measurement is the first determination of this CKM matrix element at the electroweak scale and provides an orthogonal determination of $|V_{cb}|$ compared to previous measurements.

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