



Contribution ID: 173

Type: **Parallel talks**

New results on $t\bar{t}W$ and 4-top production with the ATLAS experiment

Monday 17 July 2023 16:40 (20 minutes)

The top-quark pair production in association with a W boson is an important background to processes like $t\bar{t}H$ or 4-top production. Due to higher order electroweak corrections, the process is difficult to model. In consequence, a difference between the measured and the predicted value for $\sigma(t\bar{t}W)$ has been observed in previous analyses. To improve our understanding of this process, a new inclusive and differential measurement of this process in events with 2 or 3 leptons was performed. Also the ratio of ttW events with a positively and a negatively charged W-boson will be shown. Another challenging final state is the 4-top process. While a previous result in the 2 and 3 lepton channel already allowed to see evidence of this process, a re-analysis of this dataset with several modifications for the event selection, data-driven background estimate and the final discriminant allow for improvement on the significance. In addition to the measurement of the cross-section itself, limits are set on the production of three tops as well as on the CP properties of the top Yukawa coupling and on EFT operator coefficients affecting the 4-top production.

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