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Type: **Parallel session talk**

## NLOPS off-shell effects in precise determinations of the top-quark mass and width at the LHC

*Tuesday 22 August 2023 17:00 (20 minutes)*

Duration: 15'+5'

The precise measurement of the properties of the top quark are among the most important goals of the LHC. The signature of top quarks can only be measured through their decay products, which are almost exclusively a W-boson and a b-quark, and unbiased measurements of the top-quark pair production process are therefore performed in the final state of two W-bosons and two b-quarks (WWbb). However, the WWbb final state has further contributions from single-top production and even from channels without intermediate top-quarks. At next-to-leading order QCD, these channels interfere and cannot be calculated separately any more, and since the top quarks can be off their mass shell, also finite width effects become important.

In this contribution, we exploit a measurement of the WWbb final state in the di-lepton decay channel from ATLAS at 13 TeV together with a next-to-leading order QCD prediction supplemented with parton shower in the Powheg-Box-Res framework (denoted “bb4l”) for a determination of the top-quark mass and its width. We evaluate the impact of using the fully off-shell calculations, and study the correlation between the top quark mass and width. For the inference, we make use of a novel analytic parameter estimation ansatz, the Linear Template Fit, which will also be introduced briefly.

### Collaboration / Activity

None

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