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Capturing the interference with Diagram Removal

The generation of single top production in the Wt channel at NLO gives rise to doubleresonant diagrams that overlap with tt, and similarly for associated production with a Z or Higgs boson. Several methods exist to remove this overlap, thus avoiding double counting and separating between the two processes.

In Diagram Removal I, the amplitudes of doubleresonant diagrams are set to zero, which also removes the interference of Wt with tt. If a measurement is performed in a region where this interference is not negligible, it would be of interest it into account. Another method, Diagram Subtraction, preserves the interference. However, it relies upon momentum reshuffling, which introduces uncertainties to the prediction. An alternative method, Diagram Removal II, does not involve reshuffling and preserves the interference by subtracting the amplitude squared of the doubleresonant diagrams from the total. The predictions of Diagram Removal II from aMC@NLO are compared with other predictions for Wt and WtZ production in the context of analyses at the ATLAS experiment. Implications of using Diagram Removal II are discussed, both for measurements of single top processes and when Wt or WtZ are treated as a background. Differential distributions are shown, investigating in what regions the predictions differ the most.

Summary

Modelling Wt and WtZ production at NLO for ATLAS analyses

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