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An NLO+PS generator for top-pair and Wt production and decay including non-resonant and interference effects

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see Summary

Summary

I present a Monte Carlo generator that implements significant theoretical improvements in the simulation of top-quark pair production and decay at the LHC. Spin correlations and off-shell effects in top-decay chains are described in terms of exact matrix elements for $pp \to \ell^+ \nu_\ell \, l^- \bar{\nu}_l \, b \, \bar{b}$ at NLO QCD, where ℓ and l are two different leptonic families, and the b quark is massive. Thus, the contributions from $t\bar{t}$ and Wt single-top production as well as their quantum interference are fully included.
Matrix elements are matched to the Pythia8 parton shower using a recently proposed method that allows for a consistent treatment of resonances in the POWHEG framework.
These theoretical improvements are especially important for the interpretation of precision measurements of the top-quark mass, for single-top analyses in the Wt channel, and for $t\bar{t}$ and Wt backgrounds in the presence of jet vetoes or cuts that enhance off-shell effects. The new generator is based on a process-independent interface of the OpenLoops amplitude generator with the POWHEG-BOX framework.

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