

## Quarkonium Parton Shower in Herwig 7

*Monday 7 April 2025 16:30 (15 minutes)*

I will discuss the implementation of quarkonium parton shower and decay in Herwig 7, integrating non-relativistic QCD factorisation with spin-colour projections. Both colour-singlet and colour-octet channels are included, capturing S- and P-wave states and feed-down effects from higher excitations. The wavefunction formalism at small quark–antiquark separations is matched to short-distance coefficients, ensuring consistent spin correlations and polarisation. Comparisons with LHC data for charmonium and bottomonium show significant improvements over previous versions, confirming the accuracy of the new parameter tune. This development extends Herwig’s capabilities for heavy-flavour physics, enabling precise quarkonium predictions and stringent tests of QCD in high-energy collisions. This quarkonium parton shower will become available to the public with the release of Herwig-7.4.0.

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