

# Scattering entanglement mediated by heavy particles

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The amount of information propagated by an intermediate heavy particle exhibits characteristic features in inelastic scatterings with  $n \geq 3$  final particles. As the total energy increases, the entanglement entropy, between its decay products and other final particles, exhibits a universal sharp dip, suppressed by its small decay rate. This indicates an entanglement suppression from a low-energy effective theory to a channel dominated by an on-shell heavy particle. As demonstrations of these entanglement features, we study concrete models of  $2 \rightarrow 3$  and  $2 \rightarrow 4$  scatterings, which shed light on the entanglement structure beyond the area law derived for  $2 \rightarrow 2$  scattering. In practice, these features may be probed by suitably marginalizing the phase-space distribution of final particles. References: JHEP 10 (2025) 003 [arXiv: 2507.03555].

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