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Beyond the Narrow-Width Limit for Off-shell and Boosted Top Quark Decays

Due to its large mass the top quark plays an important role in consistency checks of the Standard Model and new-physics searches. Studies concerning precise theoretical predictions of the top production and its decay are commonly based on the narrow-width (NW) limit of the top quark propagator or on full off-shell computations. The NW limit, where the top quark is treated as an on-shell particle, allows for a convenient factorization of the top production and decay dynamics and is mostly used for current experimental analyses. On the other hand, off-shell computations consistently include non-resonant effects and non-factorizable corrections, but are more complicated to apply and determine in practice, particularly when QCD corrections are accounted for. In this talk I present a novel approach for boosted top quarks that allows to combine the factorization property of the NW limit and off-shell effects. The approach is valid in the resonance region for boosted top production and applies methodology known from SCET to the electroweak theory. The approach allows to incorporate resummed QCD corrections for differential top decay observables using boosted HQET generalizing results known from semileptonic B decays.

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