Particle Theory Seminar

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"Narrow-width approximation accuracy"

Thursday, May 29, 2008, 11:30

WBGB/021

Abstract:

Theoretical arguments and experimental observations suggest that new particles and interactions play an important role at the TeV scale and hence at the LHC. Extensions of the Standard Model (SM) often feature a phenomenology characterized by cascade decays. Reliable theoretical predictions for resonant processes with many-particle final states are thus required that match the experimental accuracies. The corresponding calculations can be significantly simplified by factorizing production and decay stages by means of the narrow-width approximation (NWA). After introducing the NWA, its accuracy and limitations are discussed. A modification is proposed to facilitate $\mathcal{O}(\Gamma/M)$-accurate predictions for resonant particle decay with similar intermediate masses and applied to demonstrate its importance for beyond SM searches.