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Unitarity bounds for b-hadron decays

Wednesday 23 April 2025 14:30 (22 minutes)

We derive a generalisation of the Boyd-Grinstein-Lebed (BGL) parametrization. Most form factors (FFs) in b-hadron decays exhibit additional branch cuts — namely subthreshold and anomalous branch cuts — beyond the "standard" unitarity cut. These additional cuts cannot be adequately accounted for by the BGL parametrization. For instance, these cuts arise in the FFs for $B \to D^{(*)}$, $B \to K^{(*)}$, and $\Lambda_b \to \Lambda$ processes, which are particularly relevant from a phenomenological standpoint. We demonstrate how to parametrize such FFs and derive unitarity bounds in the presence of subthreshold and/or anomalous branch cuts. Our work paves the way for a wide range of new FF analyses based solely on first principles, thereby minimising systematic uncertainties.

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