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Form factor curves consistent with unitarity for semileptonic decays

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We discuss a method to generate form factor curves across the entire kinematic range for semileptonic (SL) pseudoscalar to pseudoscalar decays, for example $B \to \pi\mu\nu$ and $B_s \to K\mu\nu$.

The work builds upon the Dispersive Matrix (DM) method. Using known form factor information at specific discrete q^2 points as input, the DM method allows model-independent extrapolation to any desired q^2 value in the SL physical region. Here q is the outgoing lepton-pair 4-momentum. The main obstacle in using DM results to determine phenomenological predictions, such as forward-backward asymmetry, is that it is not obvious how to exploit the bounds over continuous ranges of q^2 when integrating, for example, the differential decay rate over the physical q^2 range or over bins in q^2.

Using this method, we can generate a family of curves, each consistent with unitarity constraints, that can be used in the same way as a set generated from a parametrized fit (e.g. a z-fit). This allows integration over any desired bins. We further show some techniques to increase the computational efficiency of the method.

We demonstrate the application to determining V_{ub}.

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