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Decay constants of the pion and its excitations on the lattice

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We present a lattice QCD calculation of the ratios of decay constants of the excited states of the pion, to that of the pion ground state. We use an anisotropic clover fermion action with three flavors of quarks, and study the pion decay constants at three values of the light-quark masses, corresponding to pion masses of 391, 524 and 702 MeV. We find that the decay constant of the first excitation, and more notably of the second, is suppressed with respect to that of the ground-state pion, but that the suppression shows little dependence on the quark mass. The strong suppression of the decay constant of the second excited state is consistent with its interpretation as a predominantly hybrid state.

Primary author: Mrs MASTROPAS, Ekaterina (College of William and Mary)

Co-author: Dr RICHARDS, David (Jefferson Lab)

Presenter: Mrs MASTROPAS, Ekaterina (College of William and Mary)

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