

## A Lattice QCD Study of the $\rho$ Resonance

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We present a lattice QCD study of the  $\rho$  resonance with  $N_f = 2 + 1$  clover fermions at a pion mass of approximately 320 MeV and lattice size 3.6 fm. We study two processes involving the  $\rho$ . The first process is scattering of two pions in P-wave with isospin 1 where by using the Luescher method we determine the strong scattering phase shift, from which we determine the  $\rho$  resonance mass and decay width  $\Gamma(\rho \rightarrow \pi\pi)$ . The second process is the radiative transition  $\pi\gamma \rightarrow \pi\pi$  where we follow the Briceño-Hansen-Walker-Loud approach to determine the radiative transition amplitude in the invariant mass region near the  $\rho$  resonance and both space- and time-like momentum transfer. This allows us to determine the coupling between the  $\rho$ , the pion and the photon and the  $\rho$  radiative decay width.

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