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The isospin-0 pion-pion scattering length from twisted mass lattice QCD

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We present results for the $\pi\pi$ isospin-0 scattering length calculated in twisted mass lattice QCD. We use a set of $N_f = 2 + 1 + 1$ ensembles with pion mass varying in the range of 230MeV - 510MeV at three different values of lattice spacing and two $N_f = 2$ ensembles with one pion mass at its physical value and one at 250MeV. The quark disconnected diagrams are computed with sufficient precision by using the stochastic Laplacian Heaviside quark smearing method. For the first time we extrapolate our lattice results to the physical pion mass and continuum limit.

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