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Coulomb corrections to pi-pi scattering

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The relationship between finite volume multi-hadron energy levels and matrix elements and two particle scattering phase shifts and decays is well known, but the inclusion of long range interactions such as QED is non-trivial. Inclusion of QED is an important systematic error correction to K->\pi\pi decays. In this talk, we present a method of including a truncated, finite-range Coulomb interaction in a finite-volume lattice QCD calculation. We show how the omission caused by the truncation can be restored by an infinite-volume analytic calculation so that the final result contains no power-law finite-volume errors beyond those usually present in Luscher's finite-volume phase shift determination. This approach allows us to calculate the QED-corrected infinite-volume phase shift for \pi\pi scattering in Coulomb gauge, a necessary ingredient to K->\pi\pi, while neglecting the transverse radiation for now.

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