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Pion electromagnetic form factor from full lattice QCD

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We present the first calculation of the pion electromagnetic form factor at physical light quark masses. This form factor parameterises the deviations from the behaviour of a point-like particle when a photon hits the pion. These deviations result from the internal structure of the pion and can thus be calculated in QCD. We use three sets (different lattice spacings) of $n_f = 2+1+1$ lattice configurations generated by the MILC collaboration. The Highly Improved Staggered Quark formalism (HISQ) is used for all of the sea and valence quarks. Using lattice configurations with u/d quark masses very close to the physical value is a big advantage, as we avoid the chiral extrapolation. We study the shape of the vector (f_{π^+}) form factor in the q^2 range from 0 to -0.15 GeV^2 and extract the mean square radius, $\langle r_v^2 \rangle$. The shape of the vector form factor and the resulting radius is compared with experiment. We also discuss the scalar form factor, $\langle r_s^2 \rangle$.

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