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The lightest D_0^* resonance from QCD

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The lightest scalar charm-light D_0^* and charm-strange D_{s0}^* mesons have been puzzling in that experiments have found them at approximately the same mass. This is in contrast with the quark-model prediction. For the first time, we map out the energy dependence of the elastic Isospin-1/2 $D\pi$ scattering amplitude and find a complex D_0^* resonance pole, using Lattice QCD with a pion mass $m_\pi \approx 239$ MeV and the Lüscher finite-volume quantisation condition. The resonance, which is lighter than the D_{s0}^* found on the same lattice, is strongly coupled to the S -wave $D\pi$ channel. We find that both $q\bar{q}$ -like and $D\pi$ -like constructions are necessary to interpolate the corresponding spectrum from the vacuum.

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