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Dispersive and analytic methods to determine the $f_0(1300)$ from meson scattering data

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We determine the existence and much debated parameters of the $f_0(1300)$ light scalar resonance. We establish the existence of its associated pole in the complex plane, determining its parameters by means of analytic continuation method on a model-independent dispersively constrained analysis of $\pi\pi\rightarrow\pi\pi$ and $\pi\pi\rightarrow K\bar{K}$ data. We show how this pole appears consistently using Forward Dispersion Relations or Roy equations and different continuation methods. We also provide a simple parameterization of the $\pi\pi$ scattering data and their uncertainties up to ~ 1.8 GeV, consistent with dispersion relations up to ~ 1.4 GeV and with the poles of the $f_0(500)$, $f_0(980)$ and $f_0(1300)$ found in these dispersive studies.

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