



Nuclear Theory

Theoretical support for the $\pi(1300)$ and the recently claimed $f_0(1790)$ as molecular resonances

A. Martínez Torres, K. P. Khemchandani, D. Jido, A. Hosaka

(Submitted on 30 Jun 2011)

A study of three-pseudoscalar $\pi K \bar{K}$ and $\pi \pi \eta$ coupled system is made by solving the Faddeev equations within an approach based on unitary chiral dynamics. A resonance with total isospin one and spin-parity $J^P = 0^-$ is found with mass ~ 1400 MeV when the $K \bar{K}$ system gets reorganized as the $f_0(980)$. This resonance is identified with the $\pi(1300)$ listed by the Particle Data Group. Further, the two-body amplitude which describes the interaction between a π and the $f_0(980)$ is extracted from the study of the $\pi K \bar{K}$ and $\pi \pi \eta$ system and is then employed to study the $f_0(980) \pi \pi$ system. As a result, a scalar resonance is found near 1790 MeV which drives the two $f_0(980) \pi$ systems to resonate as the $\pi(1300)$ while the invariant mass of the two pions falls in the mass region of the scalar $\sigma(600)$. These findings support the existence of a new f_0 resonance near 1790 MeV, as found by the BES and Crystal Barrel collaborations. Our results show that this $f_0(1790)$ is definitely distinct to $f_0(1710)$, the latter of which seems to possess a glueball structure dominantly.

Subjects: **Nuclear Theory (nucl-th)**; High Energy Physics - Phenomenology (hep-ph)

Report number: YITP-11-65

Cite as: **arXiv:1106.6101 [nucl-th]**
(or **arXiv:1106.6101v1 [nucl-th]** for this version)

Submission history

From: Alberto Martínez Torres [[view email](#)]

[v1] Thu, 30 Jun 2011 01:51:33 GMT (1214kb)

[Which authors of this paper are endorsers?](#)

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

nucl-th

[< prev](#) | [next >](#)[new](#) | [recent](#) | [1106](#)

Change to browse by:

[hep-ph](#)

References & Citations

- [INSPIRE HEP](#)
([refers to](#) | [cited by](#))
- [NASA ADS](#)

Bookmark([what is this?](#))

