Combined analysis of $\gamma N \to \eta' N$, $\pi N \to \eta' N$ and $NN \to NN\eta'$ reactions

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The η' production in photon- and hadron-induced reactions are revisited [1] in view of the recent additions of high-precision data from CLAS Collaboration [2], CBELSA/TAPS Collaboration [3, 4] and COSY Collaboration [5, 6] to the world data base. In particular, we perform a combined analysis of the free and quasi-free η' photoproduction reactions off nucleons, the $\pi N \to \eta' N$ reactions and the η' production in NN collisions based on an effective Lagrangian approach [1]. It is found that the existing photoproduction data alone cannot constrain the possible resonances, while the data of the $\pi N \to \eta' N$ and $NN \to NN\eta'$ reactions help constrain them. Considering the spin-1/2 and -3/2 resonances, we show that the set of the $P_{13}(1720)$, $P_{13}(1900)$, $S_{11}(2090)$, and $P_{11}(2100)$ resonances reproduces best all the existing data in photon-, pion- and nucleon-induced reactions up to the center-of-mass energy of 2.35 GeV.

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