Two pion production in the pion-nucleon reaction

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A model for two-pion production in the pion-nucleon reaction has been developped, which replaces the low-energy constants of chiral perturbation theory by mesonic and baryonic resonances. This procedure is mainly motivated by the success of explaining the low energy constants by assuming resonance saturation. It turns out that a unitarization at the two-body level is mandatory. We therefore describe both pion-pion and pion-nucleon scattering by a K-matrix approach. The model is employed to analyse two-pion production data. In particular, the recent Crystal Ball Collaboration [1] data on the reaction $\pi^- p \to \pi^0 \pi^0 n$ are reproduced reasonably well.

[1] K. Craig et al., Phys. Rev. Lett.**91**, 102301 (2003).

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