Partial wave analysis of the $\eta\eta$ system for the reaction $\pi^- p \to \eta\eta n$ at 18 GeV/c [1]

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The $J^{PC} = 0^{++}$ $q\overline{q}$ ground state nonet has too many isoscalar candidates, suggesting the possible existence of the lowest lying scalar glueball. In 1994 the Particle Data Group[2] listed five isoscalars, three of which were well established, $f_0(980)$, $f_0(1300)$, $f_0(1590)$, and two which were not, $f_0(1370)$, $f_0(1525)$. In addition, the spin of the $f_J(1710)$ had yet to be determined. The Crystal Barrel[3] collaboration recently announced the observation of the isoscalar $f_0(1500)$, and WA91 has seen yet another isoscalar, $f_0(1450)$.

A partial wave analysis has been performed on 3,000 events produced in the reaction $\pi^- p \to \eta\eta n$ at 18 GeV/c during the 1994 run of E852 at BNL. These events come from two topologies: the 4γ final state and the $\pi^+\pi^-4\gamma$ final state. The ability to study all-neutral as well as charged-plus-neutral final states for the same reaction provides increased understanding of systematic uncertainties. This analysis is of particular interest for the $I = 0$ scalar and tensor sectors.

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[2] Particle Data Group, M. Aguilar-Benitez *et al.*, Phys. Rev. **D50** (1994).

[3] C. Amsler, Plenary talk at the 27th International Conference on High Energy Physics, Glasgow, 20-27th July 1994.