Partial wave analysis of the $f_1\pi^-$ system from the reaction $\pi^- p \to \eta\pi^+\pi^-\pi^-$ at 18 GeV/c [1]

T. Adams[g], J. M. Bishop[g], N. M. Cason[g], J. M. LoSecco[g], J. J. Manak[g], A. H. Sanjari[g], W. D. Shephard[g], D. L. Stienike[g], S. A. Taegar[g], D. R. Thompson[g], S. U. Chung[a], R. W. Hackenburg[a], C. Olchanski[a], D. P. Weygand[a], H. J. Willutzki[a], S. Denisov[b], A. Dushkin[b], V. Kochetkov[b], I. Shein[b], A. Soldatov[b], B. B. Brabson[c], R. R. Crittenden[c], A. R. Dzierba[c], J. Gunter[c], R. Lindenbusch[c], D. R. Rust[c], E. Scott[c], P. T. Smith[c], T. Sulanke[c], S. Teige[c], Z. Bar-Yam[d], J. P. Cummings[d], J. P. Dowd[d], P. Eugenio[d], M. Hayek[d], W. Kern[d], E. King[d], E. V. Anoshina[e], V. A. Bodyagin[e], A. M. Gribushin[e], O. L. Kodolova[e], V. L. Korotkikh[e], M. A. Kostin[e], A. I. Ostrovidov[e], L. I. Sarycheva[e], N. B. Sinev[e], I. N. Vardanyan[e], A. A. Yershov[e], D. S. Brown[f], T. K. Pedlar[f], K. K. Seth[f], J. Wise[f], D. Zhao[f], G. S. Adams[h], J. Napolitano[h], M. Nozar[h], J. A. Smith[h], M. Witkowski[h]

[a]Brookhaven, [b]IHEP Protvino, [c]Indiana, [d]Massachusetts Dartmouth, [e]Moscow State, [f]Northwestern, [g]Notre Dame, [h]Rensselaer Collaboration

Presented by T. ADAMS, University of Notre Dame, for the E852 Collaboration

A partial wave analysis of $f_1(1285)\pi^-$ data from E852 at BNL has been performed. The data consist of 16,000 events from the 1994 run. The f_1 is observed to decay to $\eta\pi^+\pi^-$ with dominance of the a_0 in the $\eta\pi$ spectrum. The $f_1\pi$ system has been proposed by theory as a strong candidate for a hybrid meson state. The flux tube model predicts the suppression of hybrid decays to two ground state mesons (π and ρ nonets). The orbitally excited mesons (such as the $f_1(1285)$, $b_1(1235)$, $h_1(1170)$, and the $a_2(1320)$) can absorb the transverse vibrational energy of the hybrid which leads to preferential hybrid decays to one of these mesons coupled with one ground state meson. The $f_1\pi$ system is an easily accessible hybrid candidate which has some previous experimental support for hybrid decays. Experiment 818[2] at BNL has studied $f_1\pi$ with the $K^+\overline{K}^0\pi^-$ decay of the f_1. E818 results indicate the existence of a 1^{++} state and two 1^{-+} states. Our analysis enhances the understanding of this system with an order of magnitude better statistics. The $\eta(1295)\pi^-$ system is included in the analysis. Background studies also indicate the possible existence of $a_0\rho$, $a_2\eta$ and $a_1\eta$ systems in the E852 data.

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[2]J.H. Lee et al., *Physics Letters B323*, 227(1994)