



Fig. 1. Mass-independent PWA result for the exotic 1^{++} wave in $(3\pi)^-$ final states for the 2008 data (*left*). The fitted intensity of $(1^{++})1^+ \rho \pi P$ wave is shown for the neutral mode data in comparison to the charged one (*top, left*), the relative phase difference with respect to the $(1^{++})0^+ \rho \pi S$ wave for both decay modes is shown as well (*bottom, left*). The published result with three charged pion final states from the 2004 pilot run data [5] is shown for comparison (*right*).

2 Results on Hadron Spectroscopy

In this section, we summarise the current status and newest results from partial-wave analyses (PWA) of the 2004 pilot run and the 2008 data with the focus on the search for the $\pi_1(1600)$ resonance with exotic $J^{PC} = 1^{-+}$ quantum numbers in the $\rho\pi$, $\eta\pi$ and $\eta'\pi$, and $f_1\pi$ decay channels, moreover, we briefly discuss further selected analyses.

2.1 Diffractively produced $(3\pi)^-$ final states

The present mass-independent PWA results of the search for the $\pi_1(1600)$ in the $\rho\pi$ decay channel based on the 2008 data is compared for the neutral and the charged 3π decay modes in Fig. 1, left. The PWA model applied is essentially the same as it was used for the published result (mass-independent and mass-dependent fits overlaid) that is given for comparison (Fig. 1, right), a short detailed description of the two step PWA method can be found in *e.g.* [7].

In the mass-independently fitted intensities (Fig. 1, left/top), two features appear for the neutral and charged data on top of a relatively large (presumably non-resonant, Deck-like) background. A larger peak appears for the neutral and the charged mode results at about $1.3 \text{ GeV}/c^2$ and about $1.1 \text{ GeV}/c^2$, respectively, which are still subject of detailed systematic studies (dedicated studies of background from Deck, leakage). Secondly, we find a smaller object at about $1.6 \text{ GeV}/c^2$ that is consistently observed in the neutral and charged mode results, just in the mass region where previous experiments reported the spin-exotic $\pi_1(1600)$ resonance.