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Search for Exotic Baryons at HERMES¹

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The prediction of narrow exotic baryon resonances based on the chiral soliton model has triggered an intensive search for the exotic members of an antidecuplet with spin 1/2. In this antidecuplet all three vertices are manifestly exotic. The lightest exotic member lying at its apex, named the Θ^+ , is predicted to have a mass near 1530 MeV and a narrow width. Its existence is currently the subject of considerable controversy. Experimental evidence for a second exotic member of the antidecuplet came from the reported observation of a $S=-2$, $Q=-2$ baryon resonance in proton-proton collisions at $\sqrt{s}=17.2$ GeV. An experimental search for the $\Theta^+(1530)$ and $\Xi^{--}(1862)$ resonances has been performed by the HERMES collaboration using the decay modes pK_s and $\Xi^-\pi^-$, respectively. While evidence for a peak at 1530 MeV with a statistical significance of 4σ is observed that can be interpreted as the pK_s decay of the Θ^+ , no evidence for the $\Xi^{--}(1862)$ is found. The absence of a peak in the $\Xi^-\pi^-$ spectrum near 1862 MeV allows only an estimate of an upper limit for quasi-real photoproduction of the $\Xi^{--}(1862)$. Systematic studies and future plans will be discussed as well.

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