Pentaquarks

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I will discuss the recent experimental and theoretical developments following the discovery of the Θ^+ pentaquark – an exotic $uudd\bar{s}$ baryon resonance observed in the KN channel by several experiments, and an exotic Ξ^{*--} $(ddss\bar{u})$ reported by NA49 at CERN.

I will focus on the theoretical interpretation of the data, both in terms of quark and chiral degrees of freedom, on the predictions for related exotic states, and on several unresolved questions raised by the experimental data, such why some experiments observe the pentaquarks and other don't, the apparently extremely narrow width of the Θ^+ and the determination of its parity.

I will also describe the likely properties of the proposed heavy-quark pentaquarks – an anticharmed exotic baryon Θ_c $(uudd\bar{c})$ and Θ_b^+, $(uudd\bar{b})$, which are expected to be extremely narrow or even stable against strong decays. H1 recently reported observation of a possible Θ_c candidate in $D^{*-}p$ channel. Pentaquarks are also being searched for in e^+e^- annihilation and $\gamma\gamma$ collisions in the LEP data and at B-factories.

[1] H.J. Lipkin and M. Karliner, hep-ph/0307243, hep-ph/0307343, hep-ph/0401072, hep-ph/0402260, hep-ph/0402008, hep-ph/0405002.

[2] J. Ellis, M. Karliner and M. Praszałowicz, hep-ph/0401127.

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