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Pentaquarks: do they exist or not?

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Pentaquarks, if they exist as narrow resonances, would provide a new testing ground for non-perturbative QCD. After an initial round of positive evidence for a strangeness $S=+1$ resonance at about 1535 MeV, called the Θ^+ , there is a growing body of null results by high-statistics experiments. In addition, constraints from older KN scattering data suggest that the width of the Θ^+ resonance must be uncomfortably narrow (<1 MeV) if it has spin $J=1/2$. This has led some people to pronounce the Θ^+ to be “dead”. However, the body of evidence is not yet complete. Several new experiments specifically designed to search for the Θ^+ in different reaction channels have yet to announce their results. Furthermore, it is possible that the Θ^+ could exist with spin $J=3/2$, as suggested by recent lattice gauge calculations, which allows for a more reasonable resonance width. In any case, convincing evidence for the Θ^+ is still lacking, and we should be skeptical about its existence at the present time.

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