## Phenomenology of spin 3/2 baryons with pentaquarks

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We examine several assignments of spin and parity for the pentaquark  $\Theta^+$  state  $(J^P=1/2^\pm,3/2^\pm)$  in connection with known baryon resonances [1]. Assuming that the  $\Theta^+$  belongs to an antidecuplet representation which mixes with an octet, we calculate the mass spectra of the flavor partners of the  $\Theta^+$  based on the SU(3) symmetry. The decay widths of the  $\Theta^+$  and nucleon partners are analyzed for the consistency check of the mixing angle obtained from the masses. It is found that a suitable choice of the mixing angle successfully reproduces the observed masses of  $\Theta(1540)$  and  $\Xi_{3/2}(1860)$ , when their spin and parity are assigned to be  $J^P=3/2^-$ , together with other  $J^P=3/2^-$  resonances. The decay widths of  $\Theta\to KN$ ,  $N(1520)\to\pi N$ , and  $N(1700)\to\pi N$  are also reproduced simultaneously.

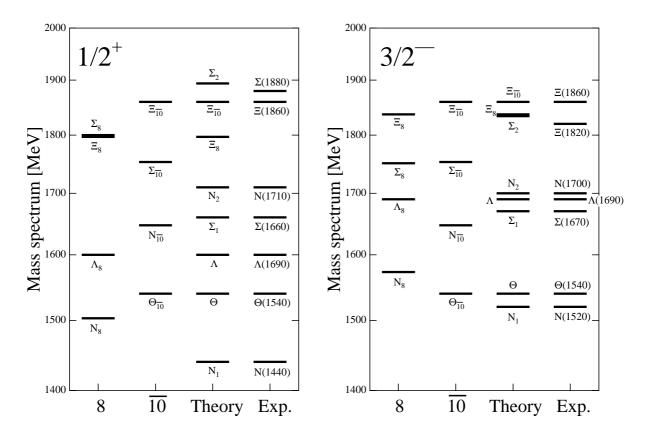


Figure 1: Results of mass spectra with representation mixing. Theoretical masses of the octet, antidecuplet, and the one with mixing are compared with the experimental masses. In the left panel, we show the results with  $J^P = 1/2^+$ , while the results with  $J^P = 3/2^-$  (set 1) are presented in the right panel.

## References

[1] T. Hyodo and A. Hosaka, Phys. Rev. D71, 054017 (2005).