# Baryon Resonances and Strong QCD

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Baryon resonances lie on Regge trajectories. It is shown that baryon masses depend strongly on their intrinsic orbital angular momenta while there is little or no evidence for spin-orbit interactions. Spin-spin interactions are induced by instanton forces with no significant contributions from magnetic hyperfine interactions. Based on these experimental observations, a new mass formula is proposed. The mass formula uses three baryon masses (N, $\Delta$, $\Omega$) and the slope of the Regge trajectory of light non-strange mesons with J=L+S as input quantities. There are no free fit parameters.
The mass formula reproduces with good $\chi^2$ all 103 but 3 baryon masses assuming a model error of 30 MeV and the possibilty of mass shifts due to hadonic effects in the order of 1/4 of the resonance width. The success of the new mass formula suggests a new concept of constituent quarks. The model reduces largely the number of 'missing resonances', and sheds new light on the the spin crisis of the nucleon.

**References**

[1] E. Klempt, "Baryon resonances and strong QCD," arXiv:nucl-ex/0203002.