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Exotic spectroscopy

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We study the possibility that at least one of the two pentaquark structures recently reported by LHCb, can be described as a compact pentaquark state, and we give predictions for new channels that can be studied by the experimentalist if this hypothesis was correct. We use very general arguments dictated by symmetry considerations, in order to describe pentaquark states within a symmetry approach. A complete classification of all possible states and quantum numbers, that can be useful both to the experimentalists, for new finding, or to theoretical model builders are given, without the introduction of any particular dynamical model.

Some predictions are finally given using a simple mass formula. We reproduce the mass and the quantum numbers of the lightest pentaquark state reported by LHCb ($J^P = 3/2^-$) state, with a parameter-free mass formula fixed on known well-established baryons. We predicted the other pentaquark resonances (giving their masses, and suggesting possible decay channels) which belong to the same multiplet of the discovered one.

In the second part of the talk will be reviewed some interesting results on Heavy quarkonium hybrids, Phys.Rev. D78 (2008) 056003) with the identification of the $Y(4260)$ as an hybrid state. Finally some results for the baryon spectroscopy within an Interacting quark diquark model for baryons (Santopinto, Phys.Rev. C72 (2005) 022201) will be discussed.

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