Contribution ID: **75** Type: **Oral Presentation**

Heavy Baryons with Strangeness

Wednesday, 10 July 2013 11:10 (20 minutes)

Abstract content
   (Max 300 words)

We are interested in the soliton description of baryons with a single heavy quark (charm or bottom). In this approach such baryons emerge as bound composites of a soliton of meson fields built from light quarks (up, down, strange) and a meson field that contains a heavy quark. The soliton must then be quantized as a diquark because the fermionic character arises from binding the heavy meson field. We are particularly interested in heavy baryons that have non-zero strangeness; in the quark model that corresponds to, say, up-strange-bottom (usb). Thus the flavor symmetry breaking among the light quarks must be fully incorporated when constructing diquark states. In the soliton model that symmetry breaking is parameterized by differences between the masses and decay constants of kaons and pions. Here we present computations of the diquark eigen-energies and eigen-functions that incorporate all orders of the light flavor symmetry breaking. We also compare these results to a leading order treatment of flavor symmetry breaking.
The heavy meson couples according to the heavy spin-flavor symmetry to the chiral field that carries the soliton. In the background of the soliton the heavy meson field develop bound states. We compute the associated binding energies. These are the seocond major ingredient for our prediction of the usb-mass.

Apply to be
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Yes

Level for award
 (Hons, MSc,
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PhD

Main supervisor (name and email)
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Would you like to
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Yes

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Session Classification: Theoretical

Track Classification: Track G - Theoretical and Computational Physics