



Объединенный институт ядерных исследований
ЛАБОРАТОРИЯ ТЕОРЕТИЧЕСКОЙ ФИЗИКИ
им. Н. Н. Боголюбова

Семинар
"ТЕОРИЯ АДРОННОГО ВЕЩЕСТВА ПРИ ЭКСТРЕМАЛЬНЫХ УСЛОВИЯХ"

Руководители: Э.-М. Илгенфритц и О. В. Теряев

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Skyrmions with vector mesons: single Skyrmion and baryonic matter

The roles of light ω and ρ vector mesons in the Skyrmion are investigated in a chiral Lagrangian derived from hidden local symmetry (HLS) up to $\mathcal{O}(p^4)$ including the homogeneous Wess-Zumino terms. We write a general master formula that allows us to determine the parameters of the HLS Lagrangian from a class of holographic QCD models valid at the large- N_c and large- λ ('t Hooft constant) limit by integrating out the infinite towers of vector and axial-vector mesons other than the lowest ρ and ω mesons. Within this approach we find that the physical properties of the Skyrmion as the solitonic description of baryons are independent of the HLS parameter a . Therefore the only parameters of the model are the pion decay constant and the vector-meson mass. Once determined in the meson sector, we have a totally parameter-free theory that allows us to study unequivocally the role of light vector mesons in the Skyrmion structure. We find that the inclusion of the ρ meson reduces the soliton mass, which makes the Skyrmion come closer to the Bogomol'nyi-Prasad-Sommerfield soliton, but the role of the ω meson is found to increase the soliton mass. This model is also applied to investigate baryonic matter as Skyrmion crystals.

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