Dibarions in the Skyrme model

E. Norvaisas, A. Acus, T. Krupovnickas, D.O. Riska

Institute of Theoretical Physics and Astronomy
A.Gostauto 12, Vilnius, Lithuania
e-mail: norvaisas@itpa.lt

Abstract

The characteristic feature of the ground state configuration of the Skyrme model description of nuclei is the absence of recognizable individual nucleons. The ground state of the skyrmion with baryon number 2 is axially symmetric, and is well approximated by a simple rational map, which represents a direct generalization of Skyrme's hedgehog ansatz for the nucleon. The deuteron may be viewed as a quantized version of this ground state configuration. It need six quantum variables to get the deuteron spin 1 and isospin 0 in SU(2) model.

We consider and the possibility for dibaryon solutions other than the deuteron, which may be represented as spin-isospin excitations of the ground state solution. If the Lagrangian density is canonically quantized this configuration may support excitations that lie close and possibly below the threshold for pion decay, and therefore describe dibaryons. From the phenomenological perspective the Skyrme model thus can accommodate narrow dibaryon states, although it does not demand their existence.