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Interactions of η-meson in asymmetric nuclear matter

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The interactions between η-meson and nucleons are studied by the unification of chiral SU(3) model and chiral perturbation theory. The η and nucleon interactions for the next to leading order terms are derived by expanding the ηN interaction Lagrangian term within the chiral perturbation theory. Using the chiral SU(3) model, we calculate the in-medium scalar density, ρ_s for different values of temperature, T, isospin asymmetry, I, and nucleonic density, ρ_N. Further, by clubbing the ηN equation of motion with the scalar density, the in-medium mass and optical potential of η meson is derived. The asymmetric matter affects are introduced through the scalar-isovector field δ and the vector-isovector field ρ. We find attractive mass-shift of the η meson which becomes more attractive with the increase in density. The negative mass-shift indicates the possibility of the formation of η-mesic nuclei.

Primary author(s) : KUMAR, Rajesh (National Institute of Technology Jalandhar India); KUMAR, Arvind (Dr B R Ambedkar National Institute of Technology Jalandhar India)

Presenter(s) : KUMAR, Arvind (Dr B R Ambedkar National Institute of Technology Jalandhar India)

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