Relativistic interpretation of nuclear tensor effects

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In this talk, we will introduce the relativistic interpretation of the nuclear tensor effects in both isoscalar and isovector channels. Based on the calculations of the density dependent relativistic Hartree-Fock (DDRHF) theory [1, 2], it is found that there exist the characteristic and strong spin dependence in the Fock contribution of nucleon-nucleon (NN) interaction. This suggests that the exchange diagrams get the nuclear tensor effects involved naturally. Similar as extraction of the tensor components in the π pseudo-vector coupling [3], we promote a relativistic formalism for the nuclear tensor force embedded in both isoscalar (σ-scalar and ω-vector) and isovector (π-pseudo-vector, ρ-vector and ρ-tensor) channels. With the relativistic formalism, the tensor effects naturally involved by the exchange diagram will be analyzed for finite nuclei and nuclear matter system, e.g., on the spin-orbit splitting, the equation of state of symmetry energy, and neutron star structure properties.

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