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Relativistic chiral mean field model and chiral property of finite nuclei and nuclear matter HIROSHI TOKI, YOKO OGAWA, JINNIU HU, RCNP, Osaka University — We study the role of pion in finite nuclei and nuclear matter with the relativistic chiral mean field (RCMF) model. In the RCMF model, we use the linear sigma model Lagrangian, which contains the nucleon field and sigma and pion fields in chiral symmetric way. We introduce further the omega meson coupling in order to include necessary repulsion to form nucleus. We take first the mean field approximation and obtain meson fluctuation terms to be treated in the 2p-2h space so that the pion exchange interaction is fully taken into account. The pion exchange interaction provides major contribution to the nuclear binding. We calculate ^{4}He, ^{12}C and ^{16}O and nuclear matter. For finite nuclei, we obtain more than a half of the attraction from the pion exchange interaction. We get an extra binding for ^{12}C than ^{16}O due to the pion exchange interaction coming from the Pauli-blocking effect. We find the nucleon mass is reduced about 20% from the free space value in the interior of finite nuclei. We calculate also chiral condensate in nuclear matter, which has a similar behavior to the model independent expression as a function of density. This behavior agrees with the behavior of isovector s-wave parameter extracted from deeply bound pionic atoms.

Hiroshi Toki
RCNP, Osaka University

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