Abstract Submitted
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Nuclear response theory for isospin transfer in relativistic framework CAROLINE ROBIN, ELENA LITVINOVA, Western Michigan University — Nuclear response theory for isospin transfer modes has numerous applications extending across the field of nuclear physics from beta decay, neutrino scattering, electron capture, two-neutrino and neutrino-less double beta decay to weak processes in stars. Precise information on such modes of excitation as Gamow-Teller resonance and spin-dipole resonance is needed to compute weak reaction rates, which are important for astrophysical modeling. In this work we present a theoretical approach to nuclear spin-isospin response. It is based on the relativistic Lagrangian and includes explicitly effective meson degrees of freedom to describe nucleon-nucleon interaction, and, at the same time, emergent collective phenomena which can be quantified consistently as an additional nucleon-nucleon interaction induced by the nuclear medium. Pion-nucleon interaction is considered with the free-space coupling constant [1,2]. The recent development introduces pairing correlations of the superfluid type, which are needed for a correct description of open-shell nuclei [3]. New results of calculations for Gamow-Teller resonance and for spin-dipole resonance in medium-mass nuclei will be presented and discussed.

[1] T. Marketin, E. Litvinova, D. Vretenar, P. Ring, Phys. Lett. B 706, 477 (2012).
[2] E. Litvinova, B.A. Brown, D.-L. Fang, T. Marketin, R. G. T. Zegers, Phys. Lett. B 730, 307 (2014).
[3] C. Robin, E. Litvinova, to be published.

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