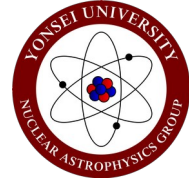




# Nuclear Theory Seminar



Isospin symmetry breaking in nuclear energy density functional  
towards accurate determination of nuclear equation of state

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May 12<sup>th</sup> (Fri) 17:00  
Science Hall 327, Department of Physics

The isospin symmetry breaking part of the nuclear interaction is a small part of the whole; however, it sometimes gives important contributions to nuclear properties, such as the difference of mirror nuclei, the isobaric analog states, and the neutron-skin thickness. The isospin symmetry breaking terms also affect the estimation of the slope parameter of the nuclear symmetry energy non-negligibly [1]. This effect is also indispensable to describe exotic nuclei, while it depends on the in-medium strength of the isospin symmetry breaking. Recently, we found that the in-medium strength determined phenomenologically is about one order of magnitude stronger than the ab initio determination [2].

In this talk, I will summarize our recent study on the isospin symmetry breaking in nuclear properties [1, 3] and introduce our recent attempt to determine the energy density functional of the isospin symmetry breaking terms based on QCD sum rule [4] and radii [5]. I will also discuss the isospin symmetry breaking in the relativistic mean-field theory [6].

- [1] T. Naito, G. Colò, H. Liang, X. Roca-Maza, and H. Sagawa. Phys. Rev. C 107, 064302 (2023)
- [2] T. Naito, G. Colò, T. Hatsuda, H. Liang, X. Roca-Maza, and H. Sagawa. Nuovo Cim. C 47, 52 (2024)
- [3] T. Naito, X. Roca-Maza, G. Colò, H. Liang, and H. Sagawa. Phys. Rev. C 106, L061306 (2022)
- [4] H. Sagawa, T. Naito, X. Roca-Maza, and T. Hatsuda. Phys. Rev. C 109, L011302 (2024)
- [5] T. Naito, Y. Hijikata, J. Zenihiro, G. Colò, and H. Sagawa. Eur. Phys. J. A 61, 177 (2025)
- [6] Y. Tanimura, T. Naito, H. Sagawa, and M.-K. Cheoun. Eur. Phys. J. A 61, 229 (2025)



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