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## Understanding Shell Evolution: Where and How?

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Atomic nuclei are finite quantum many-body systems consisting of protons and neutrons. Their structures are governed by the strong interactions. Extensive experimental and theoretical studies over the past decades have yielded sophisticated phenomenological realistic nucleon-nucleon, as well as (semi-phenomenological) chiral two- and three-nucleon interactions. However, it is still not possible to understand even the nuclear structures of relatively light nuclei such as carbon and oxygen isotopes. The tensor interactions of the realistic nucleon-nucleon interactions, for instance, are suggested to play dominant role in the shell evolutions observed in the neutron-rich nuclei. Besides, the tensor interactions also generate high-momentum components in nuclei, but their effect on nuclear structure has been largely unknown. In this talk, I will present experimental studies on neutron-rich carbon isotopes [1,2], studies of tensor-force effect in  $^{16}\text{O}$  through high-momentum transfer (p,d) reactions [3,4] as well as ongoing and future plans at IMP, RCNP, RIBF and GSI-FAIR.

### Reference

- [1] D.T. Tran, H.J. Ong et al., Phys. Rev. C 94, 064604 (2016).
- [2] D.T. Tran, H.J. Ong et al., Nat. Comm. 9, 1594 (2018).
- [3] S. Terashima, L. Yu, H.J. Ong et al., Phys. Rev. Lett. 121, 242501 (2018).
- [4] H.J. Ong, I. Tanihata et al., Phys. Lett. B 725, 277 (2013).

### Type of contribution

### Are you a student or postdoc?

no

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