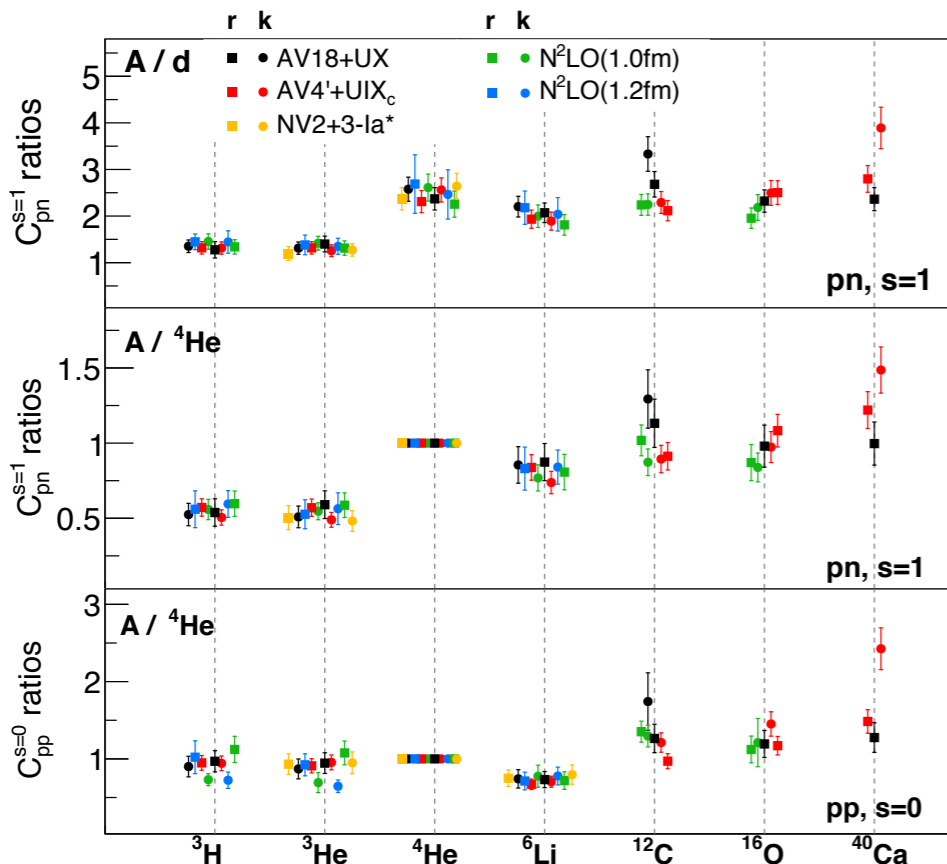


QMC scaled two-body coordinate-space densities in  $^{16}\text{O}$ .



$pn$  and  $pp$  nuclear contact ratios for nuclei  $A/d$  and  $A/{}^4\text{He}$ .

## Objectives

- We study short-range correlations (SRC) using the generalized contact formalism (GCF) and quantum Monte Carlo (QMC) calculations of nuclei from deuteron to  $^{40}\text{Ca}$ .
- We employ different realistic nuclear interactions and extract spin/isospin-dependent nuclear contacts in both coordinate and momentum space.

## Impact

- We observe a universal factorization of the nuclear many-body wave function at short distance into a strongly interacting pair and a weakly interacting residual system, the latter consistent with that of an uncorrelated system.
- Nuclear contacts are the same in  $r$ - and  $k$ -space, and contact ratios between two different nuclei shows very little dependence on the nuclear interaction model.
- Conclusions: 1. SRC effects are predominantly embedded in two-body correlations. 2. The relative abundance of short-range pairs in a nucleus is a long-range (*i.e.* mean field) quantity that is insensitive to the short-distance nature of the nuclear force.

## Accomplishments

LA-UR-21-21797

- R. Cruz-Torres, D. Lonardon *et al.*, [Nat. Phys. \(2020\)](#)
- M. Urban, [Nat. Phys. News & Views](#)
- J. Chu, [Phys.org](#)