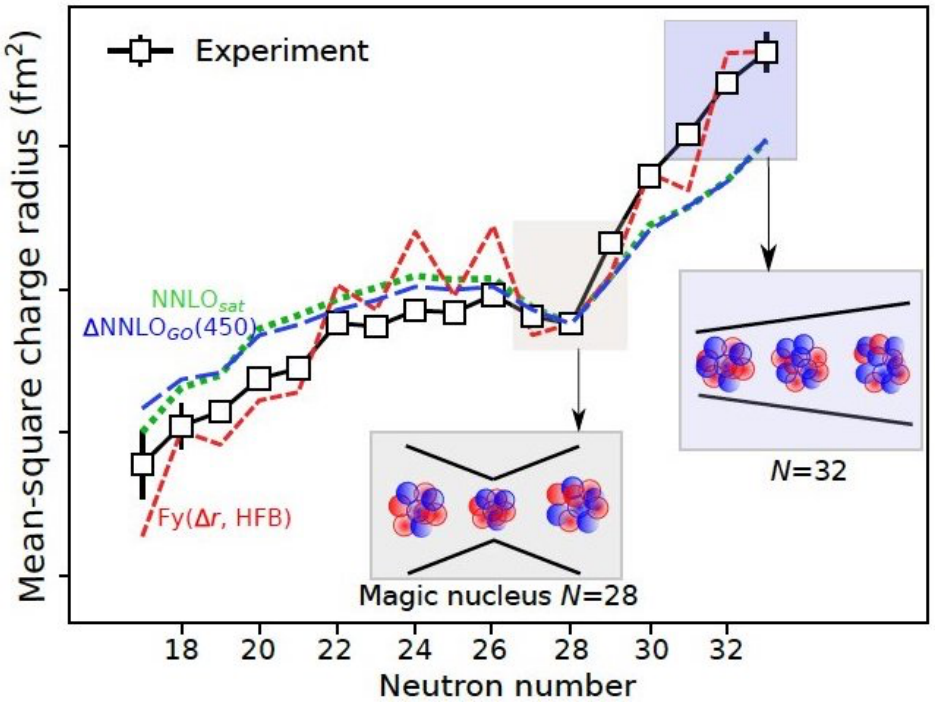
Theory of nuclear radii challenges the magic character of neutron number N=32

Objectives

- The charge radius measurement of ^{52}K does not show a signature of magic behavior at N = 32.
- Theoretical explanation was based on the state-of-the art coupled cluster and density functional theories.

Impact

- To enable computations for to open-shell nuclei, theoretical frameworks were extended to symmetry-breaking states.
- The coupled cluster theory reproduces the odd–even variations in charge radii but not the notable increase beyond N = 28. This rise is well captured by nuclear density functional theory, which, however, overestimates the odd–even staggering effect in charge radii.



Accomplishments

- Publication: Koszorús et al., Nat. Phys (2021)
- Highlighted in Nature Phys' News & Views
- Featured by Physics World and Phys.org.

Measured changes in the charge radii of potassium isotopes compared to the predictions of coupled cluster and density functional theory. The trend of the charge radii across the neutron number 32 does not follow behavior around the magic number N=28.