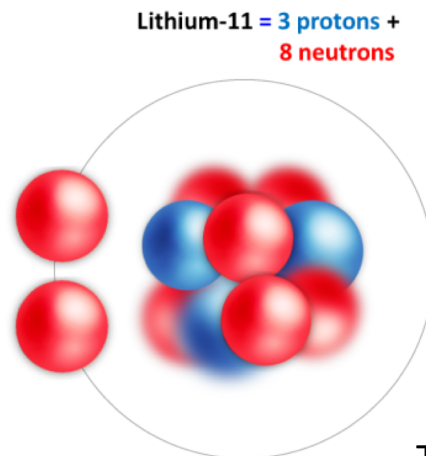
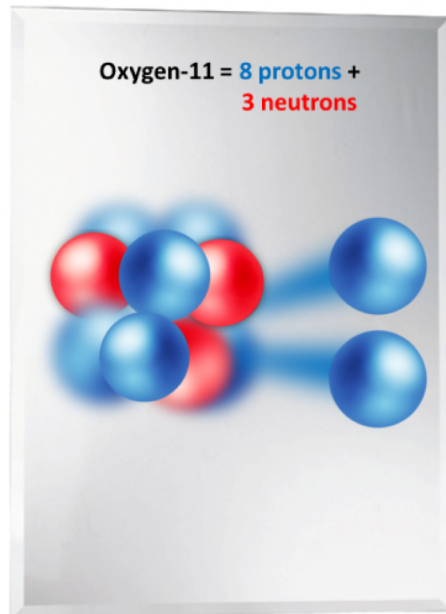




Featherweight Oxygen Explained

Objectives

- The recently discovered lightest oxygen isotope yet, ^{11}O , one with only 3 neutrons and 8 protons, was studied with the Gamow coupled-channel approach.
- The mate of oxygen-11 is lithium-11, known to have a halo composed of two very-loosely-bound neutrons. Looking at the image of lithium-11 in a neutron-to-proton inverting mirror allows for a stringent test of the symmetry of the nuclear force with respect to neutron-proton exchange.



Impact

- The calculation suggests that the peak observed experimentally is most likely a multiplet of states.
- The calculation demonstrates the importance of the coupling to the continuum for states beyond the drip lines and the role that near-threshold resonant states with zero angular momentum can play in constructing the many-body wave functions.
- The calculation indicates that the wave functions of two mirror nuclei are fairly similar. It does not need to be this way as ^{11}O is unbound while ^{11}Li is marginally bound.

Accomplishments

- Publication: T.B. Webb et al., [Phys. Rev. Lett. 122, 122501 \(2019\)](#)
- WUSTL and MSU press releases featured by several news portals

Two mirror nuclei: unbound two-proton emitter ^{11}O (left) and weakly-bound two-neutron halo ^{11}Li (right)