

Beyond the proton drip line and onward to the fuzzy proton-rich edge of the chart of nuclides

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The landscape beyond the drip lines is filled with resonances containing unbound nucleons which are momentarily constrained by centrifugal and Coulombs barriers. The further one goes past the drip lines, the larger the number of unbound nucleons and the resonances decay by spitting out these unbound nucleons in steps. Each step consisting of the removal of either a single nucleon or pair of nucleons. The structure of these states are profoundly influenced by their coupling to the continuum, a realm of scattering states above the nucleon separation threshold which designate them as open quantum systems. This can be contrasted with closed systems inside the drip lines where the nucleons are tightly bound in a restricted internal space. This talk will show our exploration beyond the proton drip line using invariant-mass spectroscopy with fast beams. Example of resonances that emit multiple protons will be presented including the recent case for 9N , a ground-state five-proton emitter. The location of the diffuse proton-rich border of the chart of nuclides where resonances cease to exist will be discussed.

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