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Proton and neutron-rich systems at and beyond the drip lines - from GSI to FAIR

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In my presentation, I'd like to address experiments using unbound nuclei very far from the valley of stable nuclei, and exploring their extreme properties.

The availability of intense secondary beams in conjunction with efficient detection setups allows for a production and study of the most extreme nuclear systems in terms of asymmetry of proton and neutron number in the continuum. Nuclei close to the drip-lines, exhibiting exotic properties themselves, are used as seeds for a subsequent production process in knockout reactions at relativistic energies. These nuclear systems challenge nuclear structure theory being open quantum systems far from the valley of beta stability as well as reaction theory while trying to describe their production mechanisms. The analysis of all particles in a kinematically overdetermined setup lead to the observation of energy and angular correlations as well as particular correlations within the different observables.

The link to intrinsic properties of the unbound systems has to be explored by comparing properties of seed nuclei and to the experimental findings in the continuum.

In my talk I will exemplify the above-mentioned methods, and present selected data on light systems from exotic Helium to Neon isotopes and show particular developments on the way to the upcoming FAIR facility.

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