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Shell structure far off stability studied via high-energy reactions

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A highly interesting topic of modern nuclear structure research is to explore the evolution of the nuclear shell far from the valley of β-stability. The nuclear shell model, being so successful in stable nuclei, relies on the prevalence of a static nuclear potential and the dominance of the mean-field dynamics. It is an open question to what extent that concept is still valid in nuclei with large neutron to proton ratio. With this talk we intend to contribute to this central question by presenting a review of recent experimental studies of exotic nuclei produced at the present in-flight RIB facilities, selecting those that highlight the studies of the structures of light nuclei with 6≤Z≤13:
a) direct reactions in inverse kinematics performed at high energies via nuclear [1] and electromagnetic probes [2], which contribute to give specific information on the single particle occupancy and correlation effects in drip line nuclei [3, 4];
b) interaction cross section measurements and experiments of proton scattering [5], well suitable to derive the density distribution and root mean square radii of the nucleon distribution in nuclei providing access to the nuclear skin along the isotopic chains [6, 7];
c) charge-changing cross sections, which show sensitivity to the proton distribution opening a new approach to explore the structure of exotic nuclei [8].

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