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Direct rections for studies of nuclei beyond the drip-lines in correlation experiments at ACCULINNA-facility

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To answer a foundamental question concerning the nuclear stability it is necessary to break through to extremely neutron- and proton- reach nuclei at the drip-line and beyond it, where nuclei exist as short-living resonances. For studies of such nuclei radioactive beams are used. During the last 15 years in the Flerov Laboratory of Nuclear reactions (JINR, Dubna, Russia) the ACCULINNA-facility was used for the experimental studies at intermediate energies 20-60 A MeV. At these energies the direct reactions are the most effective tool for studies of nuclear structure in exchange, transfer reactions, and quasi-free scattering. An important advantage of these energies is relatively intensive population of strongly alligned states allowing spin and parity identification. Instead of measurements of angular distributions in the inelastic scattering of unstable nuclei, the much less known method, based on measurements of angular correlations in decays of the unstable nuclei formed in the reactions, is used. The correlation data showed to be a powerful tool for studies of the exotic nuclear structure and decay dynamics. But their measurements complicate the experimental setup and theoretical analysis. The experimental data are biased by experimental setup making impossible direct comparison of the experimental data with theory. This problem can be handled by application of the MC simulations of the experimental "events" generated within theoretical models.
All these aspects of the exotic nucleai studies at the ACCULINNA-facility, i.e. experimental studies, MC simulations, theoretical model analysis, and theoretical model development are handled at LNR JINR. In this vein, experimental and theoretical studies of 3-body unstable nuclei 6Be, 6,8,10He, 5,7H, 17Ne are performed.

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