2015 Active Targets and TPC for Nuclear Physics Experiments Workshop

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## Active Targets for Nuclear Structure Studies with Radioactive Beams at GSI and at FAIR

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The investigation of light-ion induced reactions using radioactive beams in inverse kinematics gives access to a wide field of nuclear structure studies in the region far off stability. The experimental concept of active targets was already proven to be a usefull tool for such investigations, in particular in the region of low momentum transfer.

The world wide first experiments with radioactive beams interacting with an active target were performed at GSI Darmstadt with the IKAR setup, where the halo structure of light neutron-rich nuclei was investigated within the last 3 decades. A brief overview on recent results will be given.

The experimental conditions at the future international facility FAIR will provide outstanding opportunities for nuclear structure and nuclear astrophysics studies on nuclei far off stability, and will allow to explore new regions in the chart of nuclides. Therefore two versions of active targets, dedicated for investigations at the R3B and SUPER-FRS facilities at FAIR, are presently under design and partly under construction, one allowing for coincidence measurements of recoil particles and gammas, the other with a larger range acceptance for the investigation of recoil particles allone. The experimental program for direct reactions at low momentum transfer, which includes elastic proton scattering for the investigation of nuclear matter distributions and neutron skins,

inelastic alpha scattering for the investigation of giant resonances, and charge exchange reactions for the investigation of Gammow-Teller strength, will be discussed, and the complementarity to studies with stored radioactive beams, interacting with internal targets of storage rings, will be displayed.

Finally the status of the design, construction and the results of feasibility studies with prototype setups will be discussed.

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