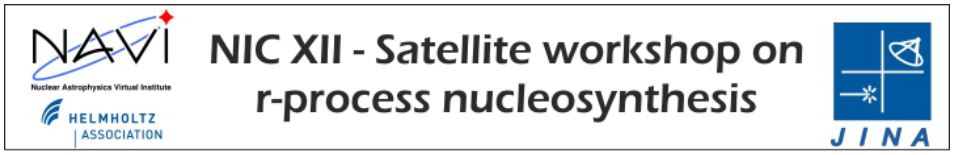

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Direct mass measurements of stored exotic nuclei

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Ground state masses belong to the most essential nuclear quantities for our understanding of nucleosynthesis processes in stars. Particularly for the r-process, masses of very neutron-rich nuclei are needed. The need is best explained by the fact that mass differences of specific neighboring nuclei define the neutron separation energy and thus determine the pathway of the process on the chart of nuclides.
Mass-spectrometry techniques aiming at mass measurements of such exotic nuclear species have thus to be extremely efficient and fast to investigate even he most neutron-rich and thus the shortest-lived nuclides which can only be produced with low yields. Two modern techniques fulfill these requirements: Penning-trap and storage ring mass spectrometry. While the former is superior in terms of achievable mass accuracy, the latter is an ideal tool to investigate the most rare nuclides. A single particle can often be sufficient to determine its mass with a high accuracy. Furthermore, the high resolving power of these techniques makes possible the resolution of long-lived nuclear states.
In this contribution the present status of mass measurements relevant for the r-process will be outlined. It is necessary to realize that even the new-generation accelerator beam facilities will not be able to provide access to the entire r-process path. Therefore, the constraining of nuclear theories by precision mass measurements is indispensable. Such measurements allow for nuclear structure investigations such as shell closures, changes of deformations, nucleon-nucleon correlations, metastable states, etc.
Last but not least, the plans will be sketched for mass measurements at present facilities as well as future prospects related to new radioactive beam facilities which are either in construction phase, like, e.g., FAIR in Darmstadt, or being just designed, like, e.g., HIAF in Erdos/China.

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