Experimental approaches for charged-particle induced reaction studies relevant for the *p* process

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The accuracy of predicted isotopic abundance distributions of heavy elements stemming from reaction-network calculations depends on uncertainties regarding the astrophysical scenarios as well as the nuclear physics input. For the *p* process, *i.e.* for the synthesis of heavy nuclei which are not originating from neutron-capture processes, thousands of reactions on mainly unstable nuclei in an explosive astrophysical scenario have to be considered.
Therefore, reducing the uncertainties of nuclear-physics input means either to measure key-reaction rates as precise as possible or performing systematic studies to improve theoretical predictions of reaction-rates.
Using the Cologne Clover Counting Setup, cross sections for charged particle-capture reactions at astrophysically relevant energies can be investigated via the activation method. Moreover, the combination of the 10MV FN Tandem accelerator and the highly efficient γ-ray spectrometer HORUS in Cologne allows to study cross sections of radiative-capture reactions in-beam via the spectroscopy of prompt γ-rays with high-purity germanium detectors.
Besides the presentation of the different experimental setups we will show recent experimental results on the key-reactions ^{92}Mo(p,γ), ^{130}Ba(p,γ), and ^{112}Sn(α,γ) as well as on other reactions which are sensitive to different nuclear-physics input for the theoretical predictions of reaction-rates.