Proton-Radioactivity Studies at the FRS after the SIS Intensity Upgrade

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In recent years considerable progress in the investigation of ground-state proton radioactivity has been made using fusion-evaporation reactions, while the method of recoil decay tagging has even provided nuclear structure information of isotopes beyond the proton drip line (see e.g. [1] and references therein). There are, however, regions of the chart of nuclei, which have proved difficult to access in this way. On the other hand, radioactive ion beams produced in high-energy fragmentation reactions [2] might be the method of choice to access these areas. After the completion of the intensity upgrade of the GSI accelerator facility in late 1999 [3], a considerable boost of intensities of beams delivered by the heavy ion synchrotron SIS can be expected, thus opening up new perspectives for further investigations of isotopes along the proton drip-line.

In this contribution a brief overview of the new components of the GSI accelerator system, such as high-current ion sources and the new RFQ section of the UNILAC accelerator, will be given. In addition, the expected beam intensities for selected isotopes will be discussed. After a short introduction to projectile-fragmentation reactions and the fragment separator FRS [4], the perspectives for studies of ground-state proton emitters in the following regions of the chart of nuclei will be addressed:

- The island of proton emitters beyond ^{100}Sn, especially the isotopes ^{103,105}Sb
- The onset of deformation between Z = 57 and Z = 61
- The trans-lead region beyond the Z = 82 shell-gap

Finally, the experimental techniques for detecting proton emission from very short-lived isotopes will be reviewed.

[1] P.J. Woods and C.N. Davids, Annu. Rev. Nucl. Sci. **47** (1997) 541
[2] H. Geissel, G. Münzenberg, and K. Riisager, Annu. Rev. Nucl. Sci. **45** (1995) 163
[3] GSI Internal Report 95-05, June 1995, ISSN 0171-4546
[4] H. Geissel et al., Nucl. Instr. and Meth. **B70** (1992) 286