

Data for S process from n TOF

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The neutron time-of-flight facility n TOF is operating at CERN since 2001. It consists of two beam lines, located at 185 and 19 m from the neutron-producing target. The main features of the neutron beam are the wide range of neutron energies, spanning over more than 10 orders of magnitude from the meV to the GeV region, the high instantaneous neutron flux and the high resolution on the neutron energy. So far, a considerable amount of important (n, g) reactions for nuclear astrophysics have been studied. In particular the n TOF collaboration has carried out a dedicated program of neutron capture measurements, which aims at determining and improving cross sections for a number of isotopes relevant to S-process nucleosynthesis: (i) for the radioactive branch-point isotopes (e. g. ^{151}Sm [1], ^{63}Ni [2], ^{147}Pm , ^{171}Tm and ^{204}Tl); (ii) for the Pb isotopes and ^{209}Bi , important for the situation at the termination point of the S process path; (iii) for stable isotopes with small capture cross sections (e. g. ^{139}La [3] and various Zr isotopes [4]), which act as bottlenecks in the S-process reaction flow; (iv) for the Mg isotopes [5, 6], which represent a neutron poison and give important constraints for the $^{22}\text{Ne}(n, n)$ neutron source; (v) for S-only isotopes such as ^{154}Gd , which can be produced only via S process because they are shielded against the β -decay chains from the R-process region by stable isobars; (vi) for the Os isotopes [7], which are a crucial input for the Re/Os cosmo-chronometer. The present astrophysical program is concentrating on measurements of Ge, Zn, Se, as well as Y, Sr and Ce isotopes.

After a brief review of the characteristics of the facility, a summary of the most important results obtained so far, and an outlook on the future astrophysical program will be presented.

References

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