Accepted Manuscript

Neutron physics with accelerators

N. Colonna, F. Gunsing, F. Käppeler

PII: S0146-6410(18)30019-X
DOI: https://doi.org/10.1016/j.ppnp.2018.02.002
Reference: JPPNP 3666

To appear in: *Progress in Particle and Nuclear Physics*

Please cite this article as: N. Colonna, F. Gunsing, F. Käppeler, Neutron physics with accelerators, *Progress in Particle and Nuclear Physics* (2018), https://doi.org/10.1016/j.ppnp.2018.02.002

Neutron physics with accelerators

N. Colonna

INFN, Sezione di Bari, Italy

F. Gunsing

CEA Irfu, Université Paris-Saclay, Gif-sur-Yvette, France

F. Käppeler

Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

Abstract

Neutron-induced nuclear reactions are of key importance for a variety of applications in basic and applied science. Apart from nuclear reactors, accelerator-based neutron sources play a major role in experimental studies, especially for the determination of reaction cross sections over a wide energy span from sub-thermal to GeV energies. After an overview of present and upcoming facilities, this article deals with state-of-the-art detectors and equipment, including the often difficult sample problem. These issues are illustrated at selected examples of measurements for nuclear astrophysics and reactor technology with emphasis on their intertwined relations.

Keywords: fast-pulsed neutron sources, quasi-Maxwellian neutron sources, neutron cross sections, time-of-flight method, activation technique, detectors for neutron reactions, applications in technology, astrophysics, and medicine

Contents