Light charged-particle production from proton- and α-induced reactions on ^{nat}Si at energies from 25 to 65 MeV

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Silicon semiconductor devices are widely used in electronic devices. Interactions of nuclear radiations from radiactive sources, particle beams and cosmic rays can cause effects ranging from transient recoverable errors, such as single-event upset, to permanent damage to the electronic device. Such radiation-induced effects are of particular concern in space and avionic applications.

In order to allow for the development of improved radiation-hardened electronic devices, it is important to be able to model all the processes triggered through nuclear reactions in the Si material. Thus, there is need for nuclear models to predict the properties of light particles and heavy recoils produced by the nuclear reactions. Many of the parameters of such models are poorly known and in order to improve their predictive power, nuclear data of light-particle-induced reactions on Si are needed.

This contribution will report on a series of in-beam experiments using proton and α-particle beams on ^{nat}Si target at the Louvain-la-Neuve accelerator facility. Inclusive data of double-differential and differential cross sections, as well as total cross sections of all possible light charged particles emitted (p, d, t, ^{3}He, α) were measured. The data were compared with the predictions of the nuclear-reaction code TALYS. A detailed discussion of the model calculations and the modifications required to improve the description of the data will be presented.