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P3.051 Measurement of neutron flux emitted from 14 MeV DT generator

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The paper reports on measurements of neutron flux emitted from a 14 MeV DT neutron generator. Such devices are widely used in material sciences, industry, medicine, etc. The used neutron generator (NSD-35) provides a controllable emission of a stabilized neutron flux, up to about 2·E8 neutrons per second in 4pi angle. According to manufacturer, more than 90% of the neutrons emitted are 14-MeV neutrons.
The detection techniques we used include the activation method and polyallyl-diglycol-carbonate (PADC) track detector. Activation samples, after irradiation and cooling, were measured using scintillation probes, e.g. LaBr(Ce). During experiment detectors were placed in azimuthal plane, at various positions around generator, and irradiated for chosen time.
In order to record neutrons using the track detector, we used special converters which, after neutron irradiation, emitted charged particles. The converters made of several materials were proposed and tested, both numerically and experimentally. Part of the detector was shielded by a thin metal filter, in order to extend energy range of the detectable particles. We also performed optimization studies of the converter and filter sets in various configurations. The particles were afterwards registered by the track detector. After developing, tracks were observed, measured and counted using an optical microscope. Precise calibration of the used detector made possible to properly identify energy, range and type of the recorded particles. Monte Carlo simulations allowed us to compute number of charged particles emitted from the converter, which then could be registered by the used detector.
The MC calculations were also used for analysis and interpretation of the measurement results. Neutron flux calculated on the basis of the described methods was in good agreement with the specification of the neutron generator.

Presenter: KWIATKOWSKI, Roch (Department of Nuclear Techniques Equipment National Centre for Nuclear Research)

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