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#4-136 Characterization of low output portable neutron generators operated at FNSPE CTU in Prague

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Low output portable DD and DT neutron generators are used at Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University in Prague for variety of research and educational applications. The paper summarizes the acquired experience related to characterisation of these devices (i.e. of the P385 type DD neutron generator and of the MP320 type DT neutron generator both produced by Thermo Fisher Scientific; the former capable of producing up to ca. 7E6 neutrons/s, the latter one up to 1E8 n/s).The neutron generator emission have been determined via activation foil technique for DT tube comparing multiple foil materials; for DD neutron generators, the choice of appropriate foil material is limited due to lower energy of emitted neutrons, thus making the use of 115In(n,n')115m reaction the most promising candidate, although it is typically used for higher neutron output devices. The paper demonstrates its limit when used with the low neutron output device. Also, manganese bath technique, well-know to characterize radionuclide neutron sources, has been applied to determine the total neutron output of DD neutron generator. Further, the pulsed mode operation has been analysed over wide range of frequencies utilizing in-house developed set-up based on RedPitaya Stem-lab. The verification of the set-up for the purpose is provided as well as the discussion of using epithermal (cadmium covered thermal neutron gas-filled detector) and fast neutron detector (of diamond type) for the purpose. Finally, the discussion is provided on measurement of neutron output dependence on operational parameters, as well as on self-activation of the devices and characteristic X-ray produced during their operation.

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