



Contribution ID: 28

Type: Oral

THE PROTON AND DEUTERON ACTIVATION AT NPI CAS AND SPIRAL2/NFS FRANCE

Tuesday 8 September 2020 13:50 (20 minutes)

Knowledge of experimental activation cross sections is important for creation and evaluation of evaluated libraries (TENDL) used by various programs for design accelerators, their components, reactors, but also for nuclear structure study. The proton and deuteron activation cross sections have been studied at NPI CAS (Nuclear Physics Institute) for many years at variable energy cyclotron U120M. Deuteron energy is limited to 20 MeV. For this reason we took advantage of the opportunity to extend this research to the new facility SPIRAL2/NFS (Neutrons For Science) constructed at GANIL/SPIRAL2 in France. Charge-particle irradiation chamber was developed and constructed at NPI CAS. The chamber is equipped with a pneumatic transfer system that allows measurement of activated isotopes with half-lives in minute region. The first test with protons was made at the end of 2019.

The proton induced reaction cross sections on iron were investigated by stacked-foil activation technique with initial proton beam of energy 20 MeV from the cyclotron U-120M of the NPI CAS, Řež and the measurements confirmed the data of previous authors. We determined production cross sections for $^{58}\text{m Co}$ and $^{58}\text{g Co}$ for the first time. We also determined the production cross sections for ^{51}Mn which were incorrectly ascribed to ^{51}Cr . The investigation will continue for higher proton energy interval up to 33 MeV at SPIRAL2/ NFS with the equipment allowing measurement of products with half-lives in minute region (e.g. $^{54}\text{m Co}$, $^{53}\text{m Fe}$) and using isotopically enriched targets.

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Session Classification: Parallel sessions