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Activation cross-sections for proton-induced reactions on natural Nd

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Cross-section data on proton-induced reactions on natural neodymium are almost entirely missing. The data are of interest for testing predictivity of the nuclear reaction model codes, some of the activation products might have potential in nuclear medicine application, and last, but not least, rate of production of the longer-lived radionuclides is needed for estimating possible disturbing effects and increase of the background during neutrinoless double beta decay experiments like SNO+. We have, therefore, measured cross-sections for formation of ^{141}Pm , ^{143}Pm , ^{144}Pm , ^{146}Pm , ^{148}Pm , $^{148\text{m}}\text{Pm}$, ^{149}Pm , ^{150}Pm , ^{140}Nd , ^{141}Nd , ^{147}Nd , ^{149}Nd , $^{138\text{m}}\text{Pr}$, ^{139}Pr , ^{142}Pr and ^{139}Ce by 10–30 MeV protons. Several stacks of metal foil targets of natural isotopic abundance protected against oxidation were irradiated on the external proton beam of the cyclotron U-120M at the Nuclear Physics Institute at Řež. Special attention was paid to the excitation functions of the long-lived radionuclides. The measured data were compared with results of the TENDL code and the thick target yields for the relevant radionuclides were calculated.

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