RCNP EXPERIMENT E246

PROPOSAL OF EXPERIMENT AT RCNP

Jan. 25, 2004

TITLE :

Low-energy proton production cross sections of 392-MeV proton induced reactions as nuclear data

SPOKESPERSONS:

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RUNNING TIME :	Beam preparation and beam tuning	1.0 days
	Data runs	2.0 days
	Total	3.0 days

BEAM LINE : ES course

BEAM REQUIREMENTS :	Type of particle	p
	Beam energy	392 MeV
	Beam intensity	1 nA

EXPERIMENTAL EXPENSES : None

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SPOKESPERSONS : Yusuke UOZUMI

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SUMMARY OF THE PROPOSAL

We propose measurements of double-differential cross sections for the production of low-energy protons below 50 MeV from proton-induced reactions on ^{12}C, ^{51}V, ^{93}Nb, ^{181}Ta and ^{208}Pb to develop nuclear data libraries. In our previous works, proton spectra ranging from 50 to 400 MeV were measured for 300- and 392-MeV proton reactions on ten target nuclei, from ^{9}Be to ^{209}Bi in the periodic table. The data have been utilized to facilitate a testing and improvement of nuclear model calculations. As a result, it was demonstrated that the quantum molecular dynamics (QMD) gives satisfactory accounts for spectra from lighter nuclei. However, QMD predictions are in poor agreements with lower-energy part of spectra for the heavier nuclei. The statistical decay model predictions for threshold energy range are also controversial.

In this proposed research, we will conduct measurements of proton spectra ranging from 50 MeV down to the threshold energy with the above five target nuclei by the use of a 392-MeV proton beam. The low-energy data are important for estimation of doses and material damage due to the hydrogen brittleness.