RCNP EXPERIMENT E218

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:

Determination of the Gamow-Teller unit cross section $\hat{\sigma}_{\mathrm{GT}}$ at 300 MeV

SPOKESPERSON:

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RUNNING TIME:	Test running time for setting up experiment	1 day
	overhead	0.5 days
	Data runs	6.5 days
BEAM LINE:		WS course + LAS
BEAM REQUIREMENTS:	Type of particle	proton
	Beam energy	300 MeV
	Beam intensity	500 nA
	Energy resolution $\leq$ 0.5 MeV (FWHM) halo-free, small emittance	
BUDGET:	Experimental expenses	1,200,000 yen
	Travel plan	600,000 yen
	Total	1,800,000 yen

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SUMMARY OF THE PROPOSAL

The quenching value Q of the Gamow-Teller (GT) strength plays a key role in spin-isospin physics. Recently we have succeeded to extract the value of $Q = 0.89 \pm 0.04(\mathrm{sta} + \mathrm{MDA}) \pm 0.04(\mathrm{IVSM})$ apart from the systematic uncertainty of the GT unit cross section of $\Delta\hat{\sigma}_{\mathrm{GT}} = \pm 15\%$. We would like to reduce the uncertainty originating from the unit cross section of $\hat{\sigma}_{\mathrm{GT}}$ to improve the reliability for Q.

For this purpose, we propose to determine the $\hat{\sigma}_{\mathrm{GT}}$ values for ^{58}Ni and ^{120}Sn at 300 MeV to an accuracy of 3% (statistical). This allows us to deduce the $\hat{\sigma}_{\mathrm{GT}}$ value for ^{90}Zr in 5% statistical accuracy.

The GT transitions of the ^{58}Ni,^{120}Sn(p,n) reactions will be measured at 300 MeV at 0° by using the (n,p) facility with an energy resolution of 700 keV. The $\hat{\sigma}_{\mathrm{GT}}$ value can be obtained by comparing the measured cross sections with the $B(\mathrm{GT})$ values of corresponding states obtained by the ^{58}Ni,^{120}Sn(^{3}He,t) reactions at 140 MeV/u with an energy resolution of 35 keV.