RCNP EXPERIMENT E240

PROPOSAL FOR EXPERIMENT AT RCNP

22 January 2004

TITLE: Continuing Investigation of the Compressional-mode Giant Resonances: Measurements in the Sn Isotopes as Tests for the Non-relativistic and Relativistic Calculations for the Nuclear Incompressibility

SPOKESPERSONS:

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EXPERIMENTAL GROUPS:
University of Notre Dame, USA - Kyoto University, Japan - Research Center for Nuclear Physics, Japan - KVI, the Netherlands.

RUNNING TIME:

Total running time not including beam preparation	8 days

BEAM LINE:

BEAM REQUIREMENTS:

Type of particle	^{4}He
Beam energy	400 MeV
Beam intensity	2 nA
Other requirements	beam must be halo-free
	highest stability over several days is required

BUDGET:

Summary of budget expenses	
Experimental expenses	2,000,000 yen

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SUMMARY OF THE PROPOSAL

The proposed measurements aim at continuing detailed investigations on the compressional-mode giant resonances: the Giant Monopole Resonance and the Isoscalar Giant Dipole Resonance (ISGDR). Over the past few years, we have investigated the ISGDR at RCNP, using inelastic scattering of 400 MeV α particles at very small angles, including $0°$. Our measurements, with the background-free spectra obtained with Grand Raiden, have resolved a longstanding problem and established that both the compressional-mode resonances (GMR and ISGDR) lead to the *same* value of nuclear incompressibility. However, there still remains a controversy in that the values of nuclear incompressibility obtained from relativistic and non-relativistic calculations based on the available GMR and ISGDR data are substantially different. We hope to help resolve this controversy by performimg measurements on a series of Sn isotopes (A=112–124) to determine the centroids of the GMR strengths to about 100 keV, thereby providing constraints on the "symmetry" term in the expression of nuclear incomprssibility.