RCNP EXPERIMENT E151

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE: Continuing Investigation of the *Isoscalar* Giant Dipole Resonance

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RUNNING TIME:

Total running time not including beam preparation	14 days (2×7)

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

SUMMARY OF THE PROPOSAL

The proposed measurements aim at continuing detailed investigations on the Isoscalar Giant Dipole Resonance (ISGDR). The ISGDR is arguably the least studied of the low-l isoscalar giant resonances. However, its enormous importance lies in that, like the giant monopole resonance (GMR), it is a compressional mode and the energy of the ISGDR is related to the nuclar incompressibility, K_A. The ISGDR, thus, provides one of the two direct iexperimental measurements leading to the compressibility of nuclear matter, K_∞.

Conclusive evidence for the ISGDR can come only from measurements at very small angles—the ISGDR lies very close in excitation energy to the high-energy octupole resonance (HEOR) and it is only at the smallest angles that the inelastic scattering angular distributions for ISGDR differ discernably from those of the HEOR.

We have recently initiated a program at RCNP to investigate the ISGDR in detail using "small-angle" (including 0°) inelastic scattering measurements with 400 MeV α particles (RCNP experiment E133). We propose to continue these measurements with a view to locating the ISGDR strength in a number of nuclei over the nuclear periodic table and establish the systematics of this resonance. The "centroids" of the ISGDR strength could, then, be used to extract K_A and the values thus obtained could be compared with those obtained from GMR.