RCNP EXPERIMENT E350

PROPOSAL FOR EXPERIMENT AT RCNP

25 January 2010

TITLE:
Low-energy dipole modes and deformation

SPOKESPERSONS:

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EXPERIMENTAL GROUP:

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THEORETICAL SUPPORT:

Name	Institution	Title or Position
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A.V. Sushkov	JINR, Dubna, Russia	Senior Researcher
J. Wambach	IKP, Technische Universität Darmstadt, Germany	Professor

RUNNING TIME:	Installation time without beam	3 days(for each beam time)
	Beam tuning time for experiment	2×2 days
	Data runs	11.0 days
BEAM LINE:		Ring : WS course
BEAM REQUIREMENTS:	Type of particle	polarized p
	Beam energy	300 MeV
	Beam intensity	$\leq$ 10 nA
	Any other requirements	energy resolution $\leq$ 25 keV
		halo-free, small emittance
BUDGET:	Experimental expenses	800,000 yen

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Low-energy dipole modes and deformation

SPOKESPERSONS: Peter von Neumann-Cosel and Atsushi Tamii

SUMMARY OF THE PROPOSAL

Polarized proton scattering at 300 MeV at 0° has been experimentally established as a tool to extract the properties of low-energy electric and magnetic dipole modes in heavy nuclei. A decomposition of the (p, p') cross sections can be achieved in two independent ways by either measuring angular distributions including 0° or by using a polarized beam and measuring polarization transfer observables to distinguish spinflip and non-spinflip contributions. Good correspondence of these two methods is achieved as demonstrated recently in a case study of ^{208}Pb. We propose to extend this technique to study a heavy deformed nucleus, ^{154}Sm, which allows to address two important questions: What is the impact of ground-state deformation on the properties of the pygmy dipole resonance? What is the nature of the double-hump structure of the spin M1 resonance in heavy deformed nuclei?