RCNP EXPERIMENT E316

PROPOSAL FOR EXPERIMENT AT RCNP

14 February 2008

TITLE:
Complete Electric Dipole Response in ^{120}Sn: A Test of the Resonance Character of the Pygmy Dipole Resonance

SPOKESPERSONS:

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EXPERIMENTAL GROUP:

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THEORETICAL SUPPORT:

Name	Institution	Title or Position
C. Bertulani	Dep. Phys., Texas A&M University, Commerece, USA	Assistant Professor
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V.Yu. Ponomarev	IKP, Technische Universität Darmstadt, Germany	Senior Researcher
N. Tsoneva	ITP, Universität Giessen, Germany	Researcher

RUNNING TIME:	Installation time without beam	3 days(for each beam time) Beam
	tuning time for experiment	2 days
	Data runs	11 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 $\leq$ 20 keV
		halo-free, small emittance
BUDGET:	Experimental expenses	1,000,000 yen

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SUMMARY OF THE PROPOSAL

A high-resolution study of the complete B(E1) strength distribution in ^{120}Sn in the energy range $E_x \simeq 5 - 25$ MeV is proposed utilizing the (p, p') reaction at $E_p \simeq 300$ MeV. This can be achieved in two independent ways by either measuring angular distributions including 0° or by using a transversely polarized beam and measuring polarization transfer observables to distinguish spinflip and non-spinflip contributions. Such data are crucial to resolve conflicting predictions of relativistic and non-relativistic QRPA calculations on the evolution of the energy centroid and collectivity of the electric pygmy dipole resonance from stable to exotic neutron-rich in Sn isotopes. These have been studied experimentally at the S-DALINAC and at GSI, respectively, but the models cannot be distinguished with limitations of the presently available experimental methods (nuclear resonance fluorescence for stable nuclei, Coulomb breakup for exotic nuclei).