RCNP EXPERIMENT E251

PROPOSAL FOR EXPERIMENT AT RCNP

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TITLE:
Measurement of Proton-Induced Subthreshold Pion Pair Production

SPOKESPERSON:

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RUNNING TIME:	Installation time without beam	3 days(for each beam time)
	Development of device	1 days
	Test running time for experiment	1 days
	Data runs	4 days
BEAM LINE:		Ring : WSS course
BEAM REQUIREMENTS:	Type of particle	unpolarized p
	Beam energy	416 MeV
	Beam intensity	$\leq$ 10 nA
	Any other requirements	halo-free
BUDGET:	Experimental expenses	950,000 yen

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SUMMARY OF THE PROPOSAL

We propose to measure the subthreshold two pion production reaction off nuclear target, the $A(p, \pi^+\pi^-)X$ reaction, with the 416 MeV proton beam at the WSS beam course of the RCNP Ring Cyclotron facility. The magnitude of the reaction cross section and the $\pi^+\pi^-$ invariant mass distribution will provide the information on the strength of the $\pi^+\pi^-$ amplitude in nuclei at the low invariant mass region. The information has a close relation with the modification of the spectral function of the σ meson or $f_0(600)$ resonance due to a partial restoration of the chiral symmetry in nuclei argued by the TRIUMF/CHAOS collaboration.

Though the subthreshold reaction cross section is expected to be tiny at the beam energy, the large acceptance Osho spectrometer system at the WSS beam course and a dedicated trigger system will make the measurement possible within a reasonable period of beamtime. In this proposal, the current status of the detector system, the trigger development and a pilot experiment is presented. An update plan of the DAQ and the trigger systems for the proposed experiment is described.