PROPOSAL FOR EXPERIMENT AT RCNP

6 July 2004

TITLE:

Measurement of Proton-Induced Subthreshold Pion Pair Production SPOKESPERSON:

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EXPERIMENTAL GROUP:

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Tomokazu Fukuda	Dep. of Physics, Osaka Electro-Communication University	(P)
Yutaka Mizoi	Dep. of Physics, Osaka Electro-Communication University	(L)
Wataru Imoto	Dep. of Physics, Osaka Electro-Communication University	(D3)

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 $\leq 10 \text{ nA}$ Any other requirements halo-free

BUDGET: Experimental expenses 950,000 yen

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Measurement of Proton-Induced Subthreshold Pion Pair Production

SPOKESPERSON: Atsushi Sakaguchi

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.