RCNP EXPERIMENT E214

PROPOSAL FOR EXPERIMENT AT RCNP

22-July-2003

TITLE:

Development of high-resolution halo-free beams for high-resolution inelastic scattering experiments at zero degrees

SPOKESPERSONS:

Name	Atsushi Tamii
Institution	Research Center for Nuclear Physics, Osaka University
Title or Position	Associate Professor
Address	10-1, Mihogaoka, Ibaraki, Osaka 567-0047, Japan.
Phone number	+81-(0)6-6879-8935
FAX number	+81-(0)6-6879-8899
E-mail	tamii@rcnp.osaka-u.ac.jp

Name	Yoshitaka Fujita
Institution	Department of Physics, Osaka University
Title or Position	Associate Professor
Address	1-1, Machikaneyama, Toyonaka, Osaka 560-0043, Japan.
Phone number	+81-(0)6-6850-5506
FAX number	+81-(0)6-6850-5516
E-mail	fujita@rcnp.osaka-u.ac.jp

EXPERIMENTAL GROUP:

Name	Institution	Title or Position
Kichiji Hatanaka	RCNP, Osaka Univ.	(P)
Yasuhiro Sakemi	RCNP, Osaka Univ.	(AP)
Takane Saito	RCNP, Osaka Univ.	(AP)
Takahisa Itahashi	RCNP, Osaka Univ.	(AP)
Shiro Ninomiya	RCNP, Osaka Univ.	(A)
Hirohiko Fujita	RCNP, Osaka Univ.	(R)
Youhei Shimizu	RCNP, Osaka Univ.	(D2)
Kohsuke Nakanishi	RCNP, Osaka Univ.	(D1)
Kunihiro Fujita	RCNP, Osaka Univ.	(D1)
Yuji Tameshige	RCNP, Osaka Univ.	(M2)
Yoshihiro Shimbara	Dep. of Phys., Osaka. Univ.	(D3)
Tatsuya Adachi	Dep. of Phys., Osaka. Univ.	(D3)
M. Yosoi	Dep. of Physics, Kyoto Univ.	(A)

RUNNING TIME:

Development Beam Time	7 days

BEAM LINE:

Ring : WS course

BEAM REQUIREMENTS:

Type of particle:	$\vec{p}$ at 200 MeV and ^{3}He at 420 MeV
Beam intensity:	< 10 nA
Other requirements:	High resolution mode, seeking the single turn extraction at the AVF cyclotron, a halo-free low emittance beam.

BUDGET:

Experimental expenses	0 yen
Travel planes	0 yen

RCNP EXPERIMENT E214

TITLE:
Development of high-resolution halo-free beams for high-resolution inelastic scattering experiments at zero degrees

SPOKESPERSONS: Atsushi Tamii and Yoshitaka Fujita

SUMMARY OF THE PROPOSAL

We propose to develop high-resolution halo-free beams for the use of inelastic scattering experiments with a very good energy resolution at the scattering angle of zero degrees and at forward angles. Once the experimental techniques are established, the small-angle inelastic scattering experiments will be a unique and promising tool for exploring the nuclear structures of various targets.

Our goal is to obtain high resolution ($\leq$10 keV) proton inelastic scattering data at zero degrees and forward angles for targets as heavy as ^{208}Pb at the intermediate incident energies, where the spin excitations are prominent.

For this purpose, we find it very important to achieve the condition of single turn extraction of the AVF cyclotron and to obtain beams with small energy spread and small emittance. We plan to do a systematic study in order to realize a good turn separation at the extraction point of the AVF cyclotron as the first stage of the development. A proton beam at 200 MeV or a ^{3}He beam at 420 MeV are the good candidates for the test.

At the second stage, we test the feasibility test of the zero-degree measurements and seek practical experimental conditions. The background condition and angular resolution are checked as well as the energy resolution by applying the lateral and angular dispersion matching method.

The development is proposed as a collaborated project between the accelerator group and the experimental group. This study also provides valuable data and information for the planned improvements of the accelerator complex at RCNP.