

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:

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EXPERIMENTAL GROUP:

Name	Institution	Title or Position
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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 ^3He 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

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 (≤ 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 ^3He 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.