

PROPOSAL FOR EXPERIMENT AT RCNP

17 May 2001

TITLE:**Study of Anomalous Pion Production in Proton Collisions with Nuclear Targets****SPOKESPERSON:**

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EXPERIMENTAL GROUP:

| Name | Institution |
|------------------------|---|
| N. Matsuoka | Research Center for Nuclear Physics, RCNP, Osaka |
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| J. Kamiya | Research Center for Nuclear Physics, RCNP, Osaka |
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| I.Tanihata | Institute of Physical and Chemical Research, RIKEN, Wako |
| T.Fukuda | Institute of Particle and Nuclear Studies, KEK, Tsukuba |
| H.Koori | Tokushima University, Tokushima |
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| Natalia S. Topilskaya | Institute for Nuclear Research of Russian Academy of Sciences, Moscow |

RUNNING TIME: Installation time without beam —
 Test running time for experiment not including
 beam preparation 2 days
 Data runs 8 days

BEAM LINE: Ring : WN course or WS course(if possible)

BEAM REQUIREMENTS: Type of particle protons
 Beam energy 340, 350, 360, 370 MeV
 Beam intensity ≤ 10 nA
 Any other requirements energy resolution ≤ 100 keV

BUDGET: Experimental expenses No special experimental expenses
 from RCNP

Travel plans 2 participants from Institute for Nuclear
 Research of Russian Academy of Sciences, Moscow,
 will be supported by fellowship programs

TITLE:**Study of Anomalous Pion Production in Proton Collisions with Nuclear Targets****SPOKESPERSON:** Alexei B. Kurepin**SUMMARY OF THE PROPOSAL**

Several experiments performed recently on pion production in proton-medium weight nuclei collisions revealed a considerable increase of pion yield at 350 MeV proton energy with narrow width of about 5 MeV. This resonance-like structure could be accounted for by the new phenomena in connection with nonnucleon degrees of freedom in nuclei.

However due to some experimental complications these experiments were limited to very few points on the resonance curve. Therefore the exact position and the width of the resonance were determined with poor accuracy.

We plan to realize the detailed measurements of excitation function for positive and negative pion production in proton-nucleus collisions on RCNP K=400 cyclotron. LAS spectrometer will be used as pion detector. In order to confirm the observed resonance-like effect the pion production measurements with proton beam should be performed at several proton energies near 350 MeV on targets of Cu, C and Pb for pion production angles from 40° to 140° . From the measurements of pion angular distributions one could determine the spin, isospin and parity of the resonance under investigation.