RCNP EXPERIMENT E324

PROPOSAL FOR EXPERIMENT AT RCNP

July 2008

TITLE:
High energy gamma-ray imaging in proton therapy using Electron Tracking Compton Camera

SPOKESPERSON:

Name	Toru Tanimori
Institution	Physics Department, Kyoto University
Title or Position	Professor
Phone number	+81-75-753-3858
FAX number	+81-75-753-3799
E-mail	tanimori@cr.scphys.kyoto-u.ac.jp

EXPERIMENTAL GROUP:

Name	Institution	Title or Position
H. Kubo	Physics Department, Kyoto University	RA
K. Miuchi	Physics Department, Kyoto University	RA
K. Ueno	Physics Department, Kyoto University	D3
S. Krosawa	Physics Department, Kyoto University	D1
S. Iwaki	Physics Department, Kyoto University	M2
M. Takahashi	Physics Department, Kyoto University	M1

RUNNING TIME: two weeks
BEAM LINE: discussing with Prof. Hatanaka

BEAM REQUIREMENTS:

Type of Particle	proton
Beam Energy	150 MeV
Beam Intensity	1×10^{10} protons/sec and 1×10^{8} protons/sec

BUDGET:
Experimental expenses 0 JPY

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SUMMARY OF THE PROPOSAL

We developed an Electron Tracking Compton Camera (ETCC) based on the micro pattern gas detector for medical gamma-ray imaging. This detector consists of micro Time Projection Chamber (TPC) for tracking a scattered electron and the pixel scintillation array for detecting a recoil gamma ray. By 3-dimensional tracking of the scattered electron in Compton process, ETCC is a unique Compton gamma-ray imager which can not only reconstruct the incident direction of the gamma ray uniquely (usual Compton imager provides only the conical direction), but also have an ability of the background rejection by the kinematical fit.

We propose the performance test of a 10cm-cubic ETCC for imaging of high energy gamma rays and fast neutrons from the human body phantom (water cylinder tnak) irradiated by about 150 MeV proton beam with an intensity of 10^{8-10}pps.