# 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:**

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|---|---|
| Type of Particle | proton |
| Beam Energy | 150 MeV |
| Beam Intensity | $1\times10^{10}$ protons/sec and $1\times10^{8}$ protons/sec |

**BUDGET:**
Experimental expenses 0 JPY

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

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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.