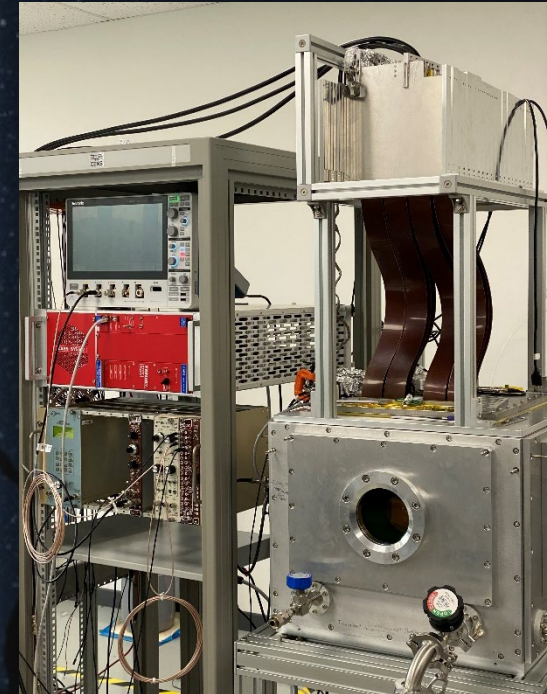
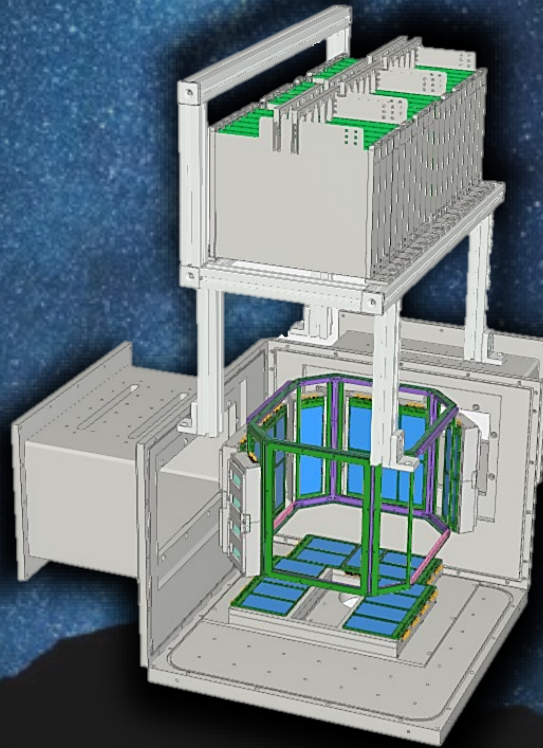
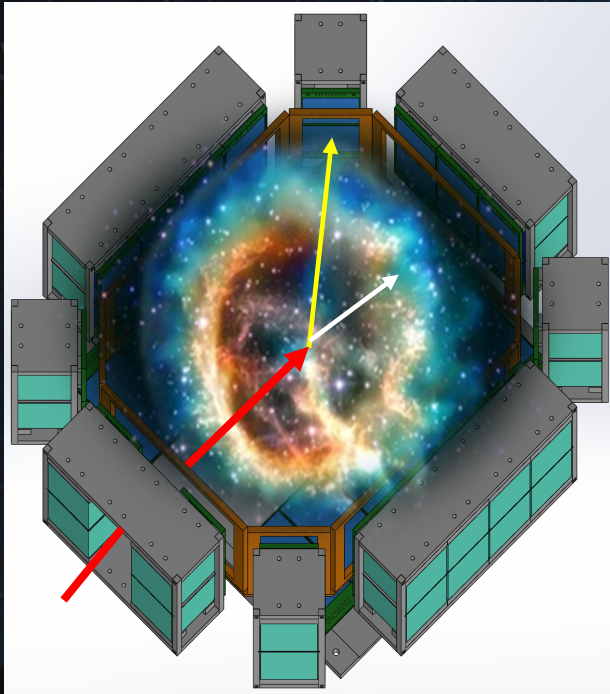


Development of a new Active Target TPC for Multiple nuclear physics eXperiments (AToM-X)

S.M. Cha¹, S. Ahn¹, S. Bae², S.K. Do^{1,3}, G.M. Gu^{1,4}, K.I. Hahn¹, J.Y. Huh¹, J.W. Lee¹, Z. Luo¹, A. Kim³, M.J. Kim², C. Park²

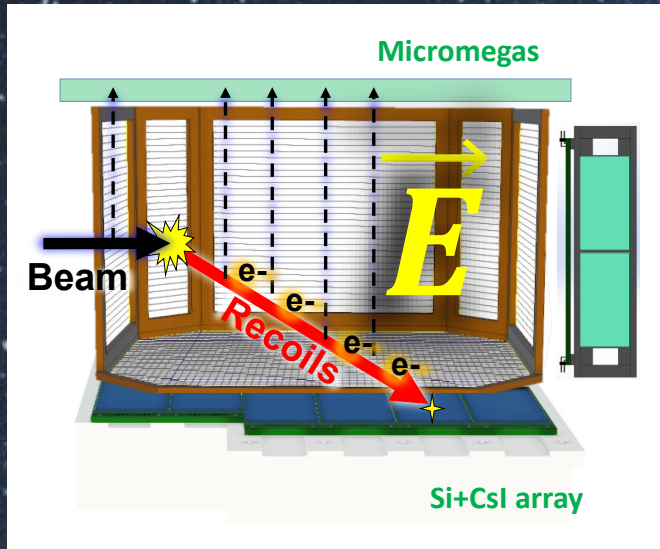
¹CENS, IBS, ²IRIS, IBS, ³Korea Univ., ⁴Sungkyunkwan Univ.



can be used for various measurement:

(α, p) , (p, α) , scattering, fusion, transfer, charged particle decay, ...

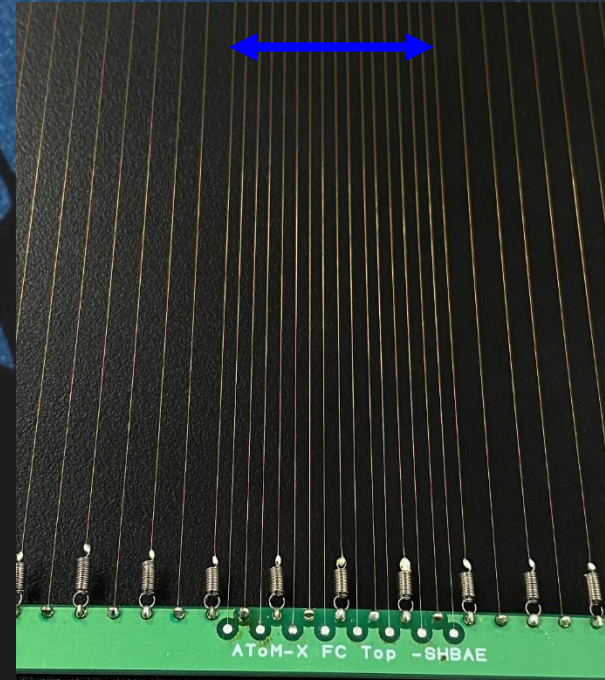
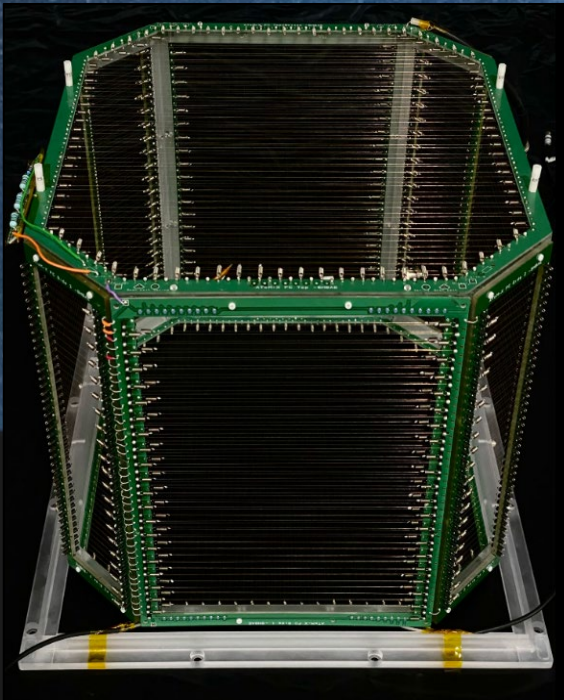
Component of the AToM-X



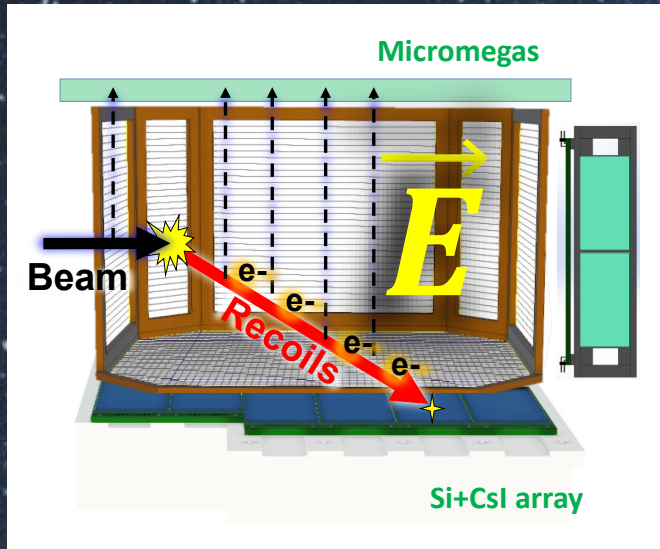
Field cage:

- ✓ For providing uniform electric field
- ✓ Octagonal shape
- ✓ Au-plated tungsten wires on the PCB
- ✓ Gating grid for reducing space charges

✓ Under the test



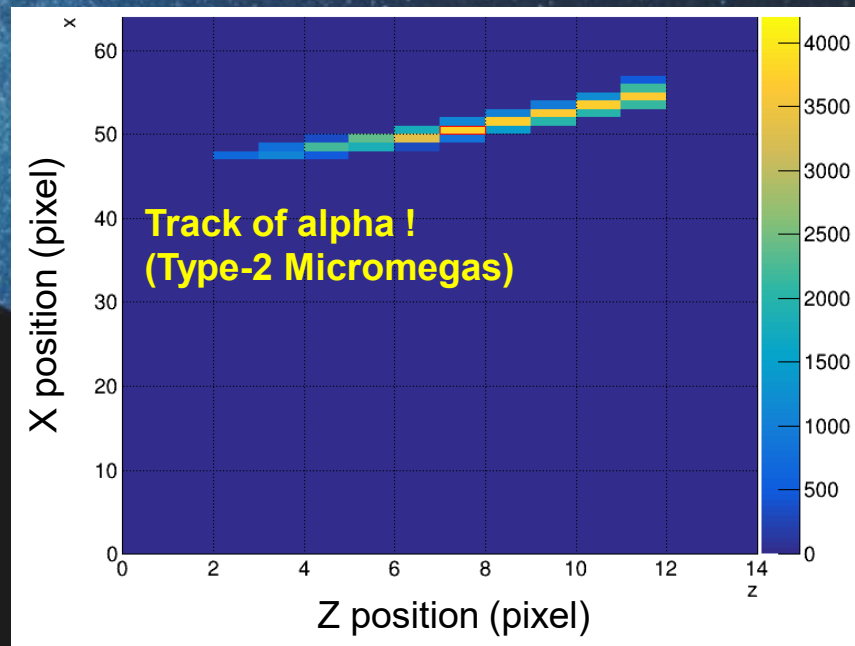
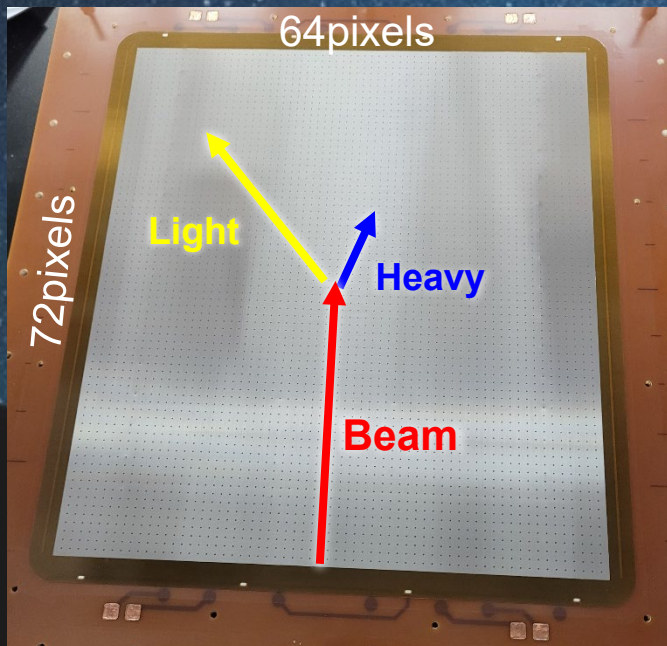
Component of the AToM-X



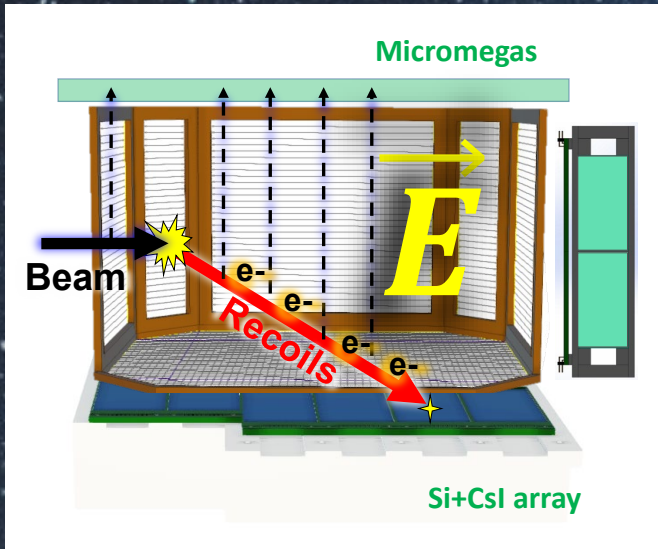
Micromegas:

- ✓ For tracking charged particles with readout
- ✓ $4 \times 4 \text{ mm}^2$ pixels
- ✓ Resistive + Capacitive sharing method
- ✓ Additional gain using GEM foil
- ✓ Expected position resolution $\sim 1 \text{ mm}$

✓ Reconstruction algorithm under development

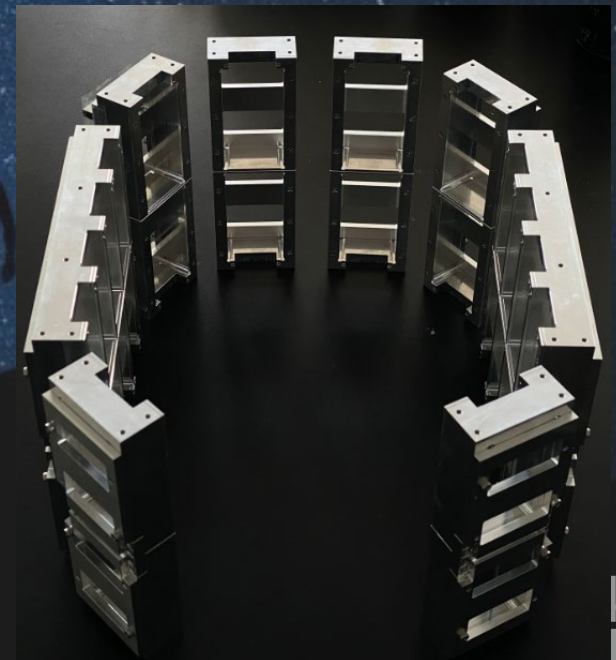
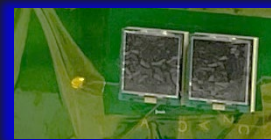
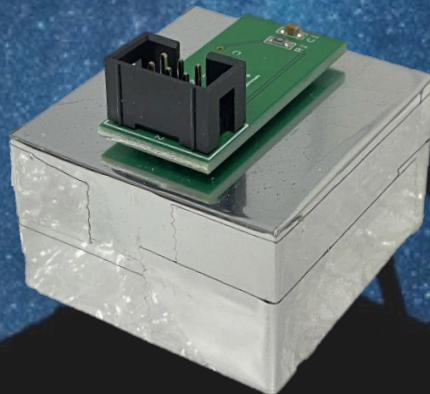
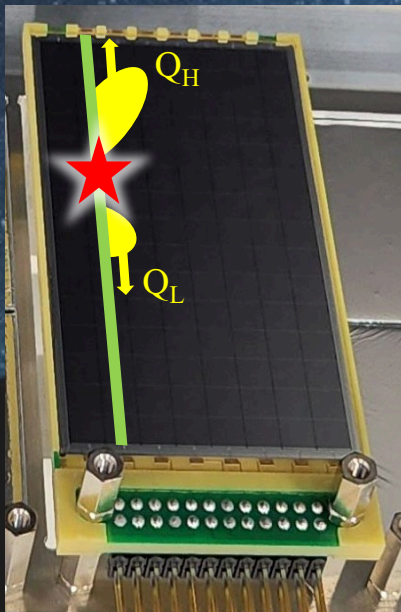


Component of the AToM-X

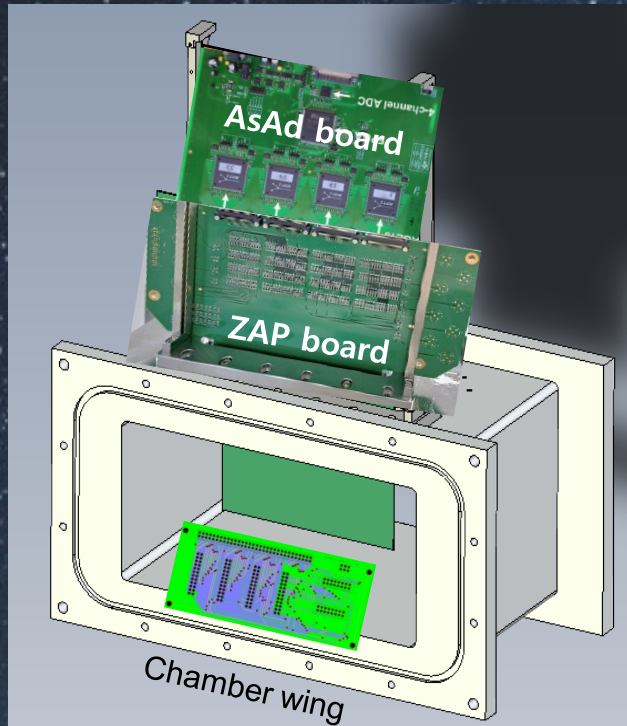


Si+Csl array:

- ✓ For measuring energy and position info.
- ✓ Si : X6 detector (resistive technique)
~1mm / 50 keV resolutions using an α -source
- ✓ Csl with SiPM
~12% resolution using an γ -ray source



Component of the AToM-X



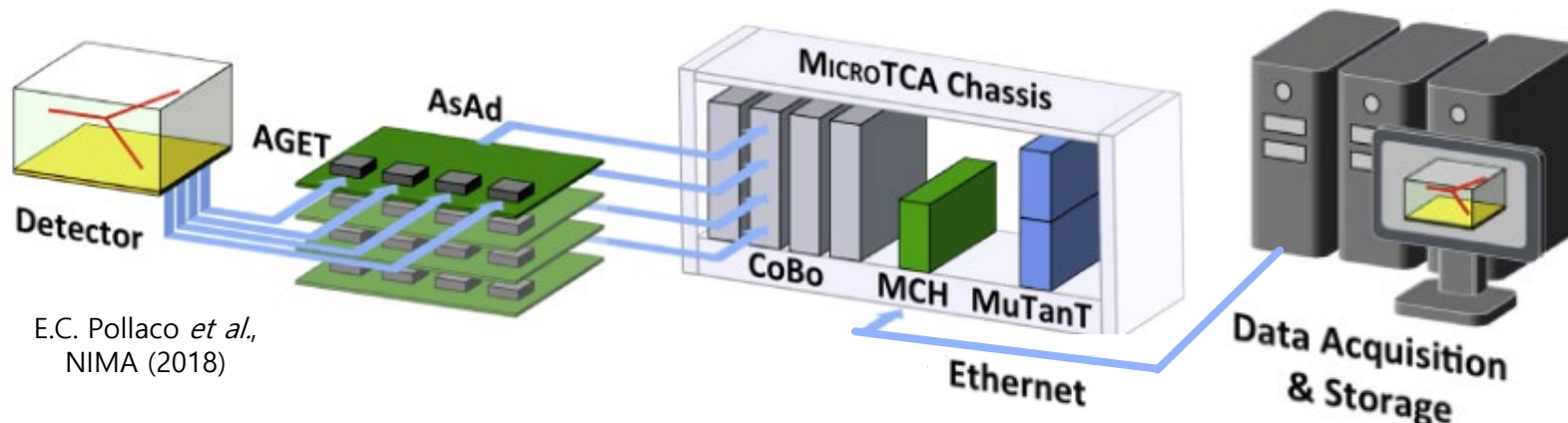
Electronics & DAQ & Software

- ✓ General Electronics for TPC (GET)
- ✓ Signal merging PCBs and ZAP boards
- ✓ Analysis software package using LILAK (task-based)

Contact: J.W.Lee

<https://github.com/lilak-project>

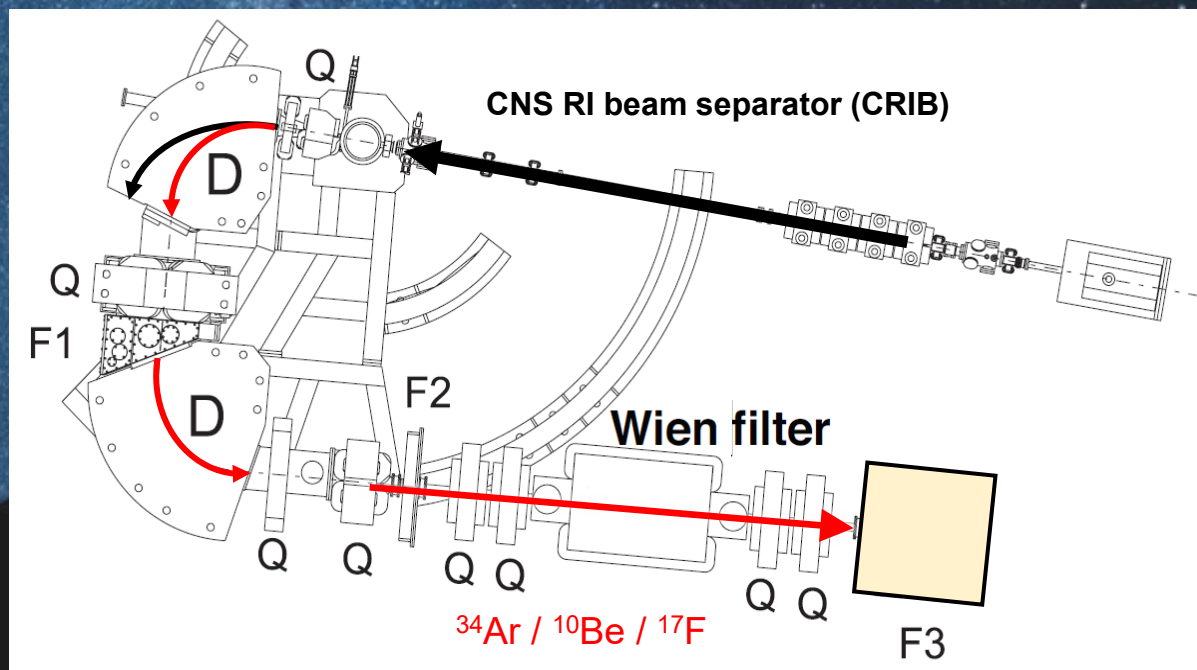
- ✓ GEANT4 & Garfield++ simulation



E.C. Pollaco *et al.*,
NIMA (2018)

Physics plans

- ✓ $^{12}\text{C}(p,p')^{12}\text{C}^*$ scattering at JAEA for the triple- α process **Approved (J.W. Lee et al.)**
- ✓ $^{34}\text{Ar}(\alpha,p)^{37}\text{K}$ measurement at CRIB for X-ray burst **Approved (A.Kim et al.)**
- ✓ $^{10}\text{Be}(p,\alpha)^7\text{Li}$ measurement at CRIB for destruction of Be **Approved (M.J.Kim et al.)**
- ✓ $^{17}\text{F}(\alpha,p)^{20}\text{Ne}$ measurement at CRIB for XRB and CCSN **Approved (S.M.Cha et al.)**
- ✓ resonant scatterings, transfer reactions,
- ✓ fusion reactions for understanding reaction dynamics, ...



Waiting for the collaboration !

CENS, IBS

CEA, Saclay

TOPTIER

Texas A&M Univ.

The Univ. of Tokyo

Sungkyunkwan Univ.



IRIS, IBS

IMP

JAEA

Korea Univ.

