

# **MIMAC: Micro-tpc MAtrix of Chambers**

## **Large TPC for non-baryonic dark matter search**

**LPSC (Grenoble) : F. Mayet , D. Santos , C. Grignon (post-doc),  
J. Billard (Ph.D )**

**Technical Coordination : O. Guillaudin**

- Electronics : G. Bosson, J-P. Richer**
- Gas detector : A. Pellisier, O. Zimmermann**
- Data Acquisition: O. Bourrion**
- Mechanical Structure : Ch. Fourel**
- Ion source : T. Lamy, J. Angot, P. Sole**

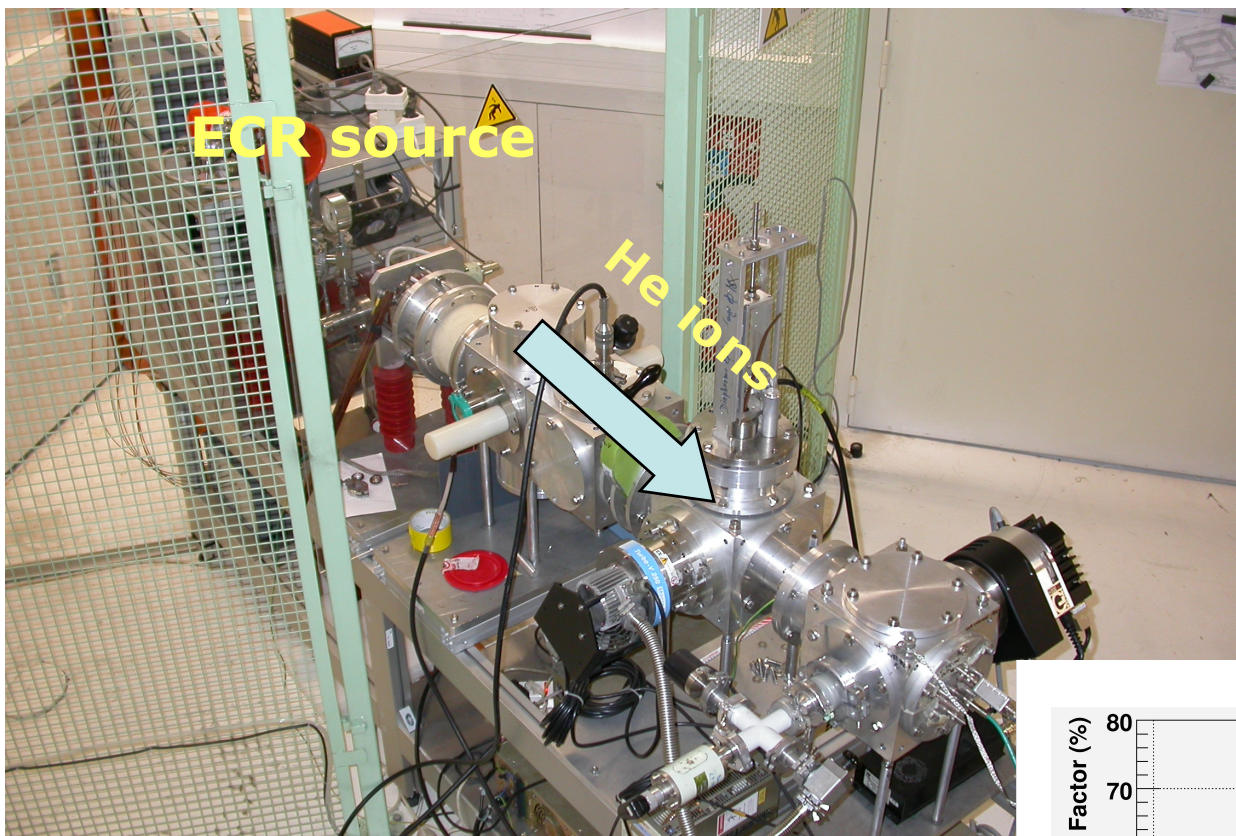
**CEA-Saclay (IRFU): I. Giomataris, P. Colas, A. Giganon,  
E. Ferrer, J-P. Mols**

**IRSN (Cadarache): L. Lebreton, C. Golbach**

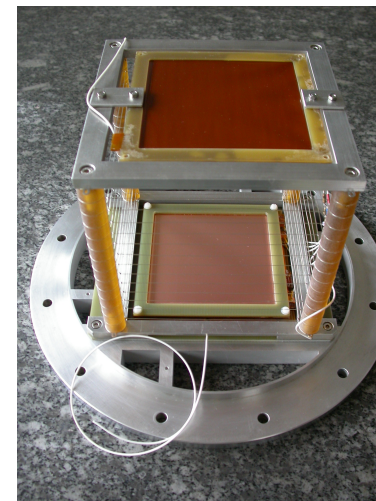
# Why do we think we need a large TPC?

- Directionality  
(correlation with galactic halo)
- Axial interaction ( $^1\text{H}$ ,  $^3\text{He}$ ,  $^{19}\text{F}$ )  
(complement of scalar (coherent) search )
- Mass dependence cross section (modularity)
- Low energy threshold detection ( $< 300$  eV)

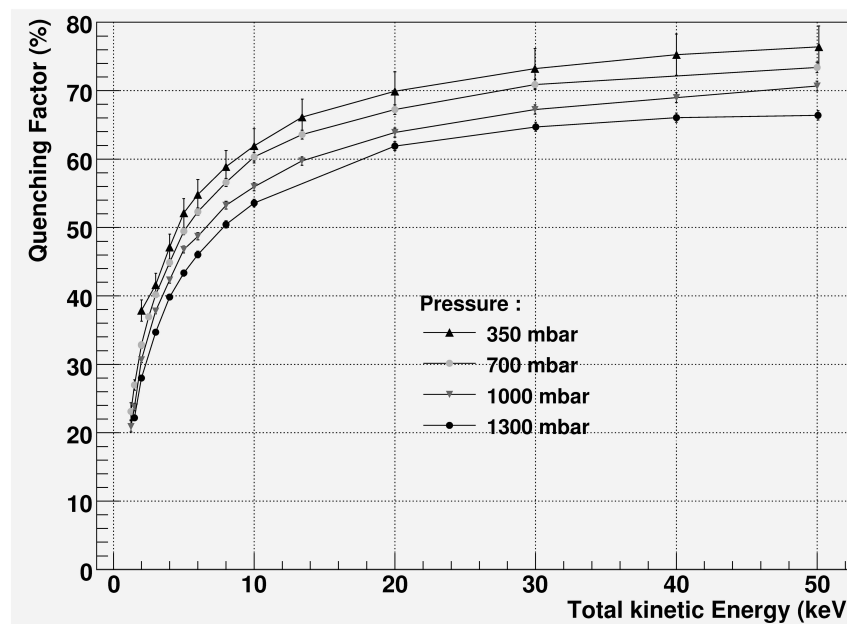
# Quenching factor measurement facility



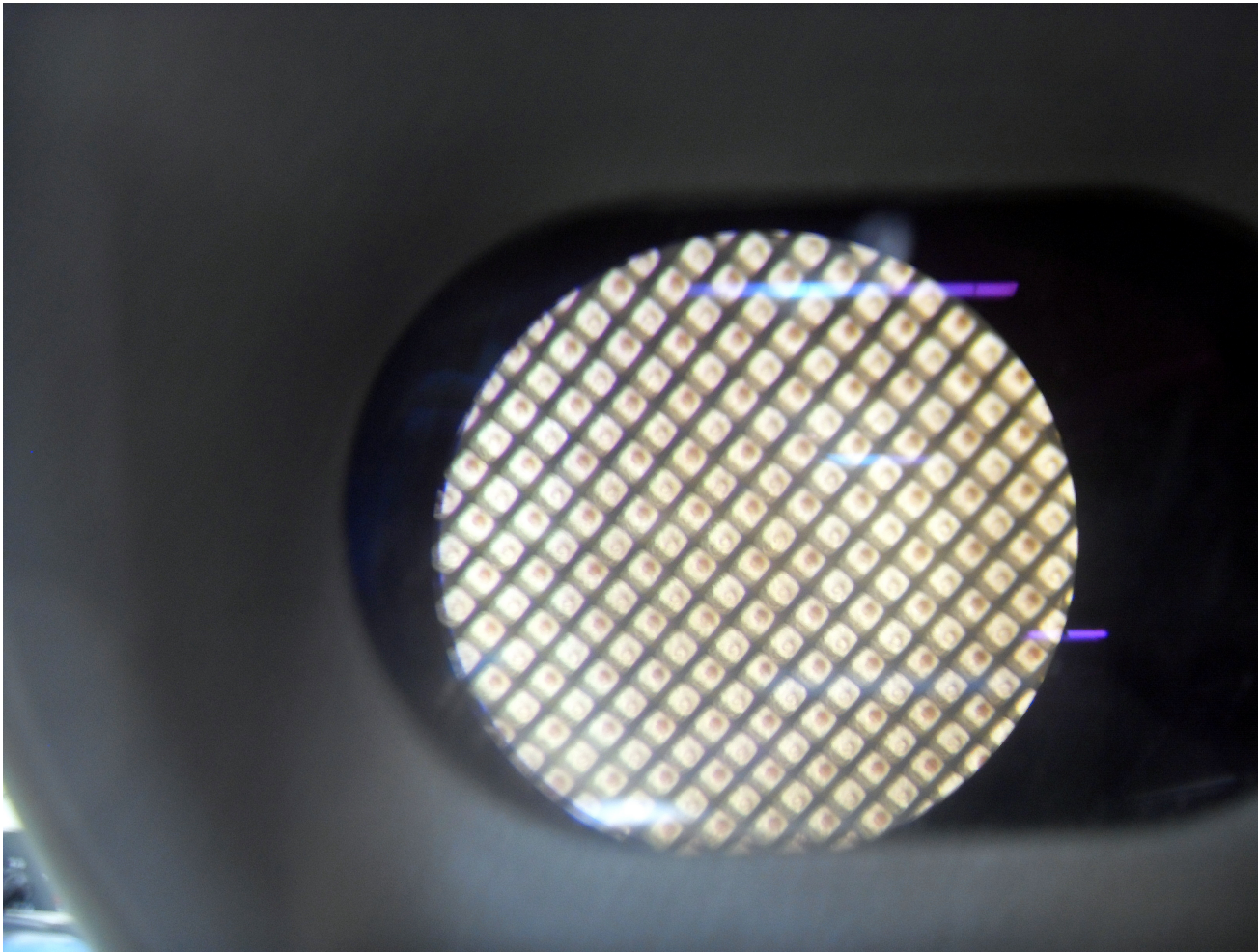
Micromegas  $\mu$ TPC



- **Low energy ion source**  
**1 to 50 keV**
- **Developped @LPSC**

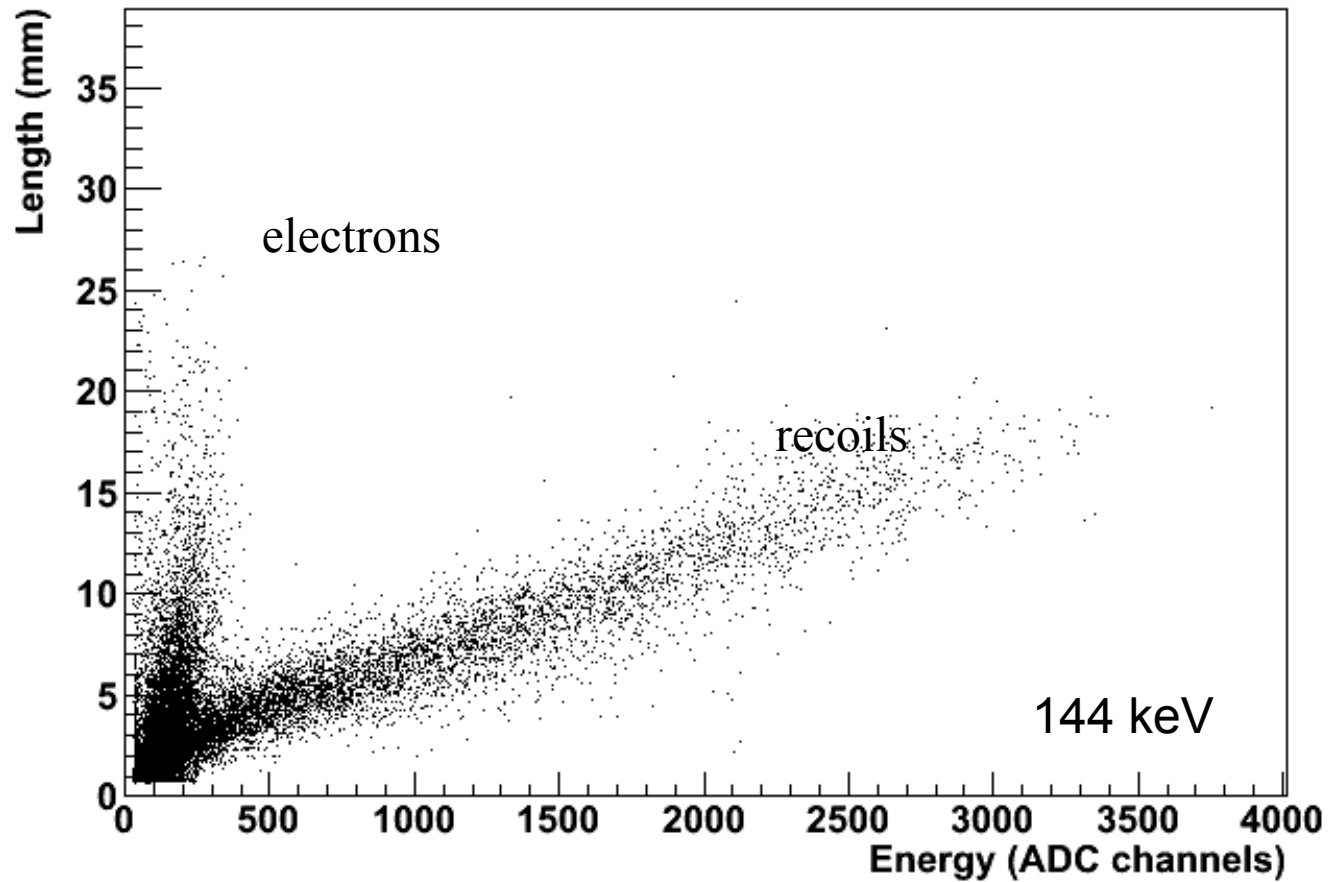


# A small part of the 10x10 cm<sup>2</sup> pixelized anode (Saclay-MIMAC)

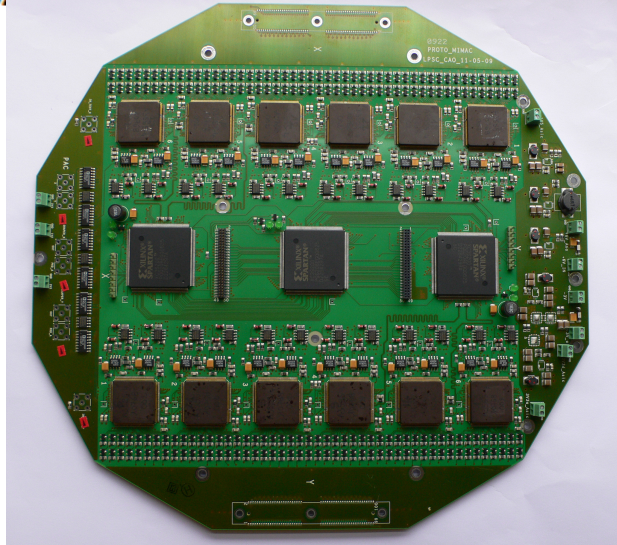
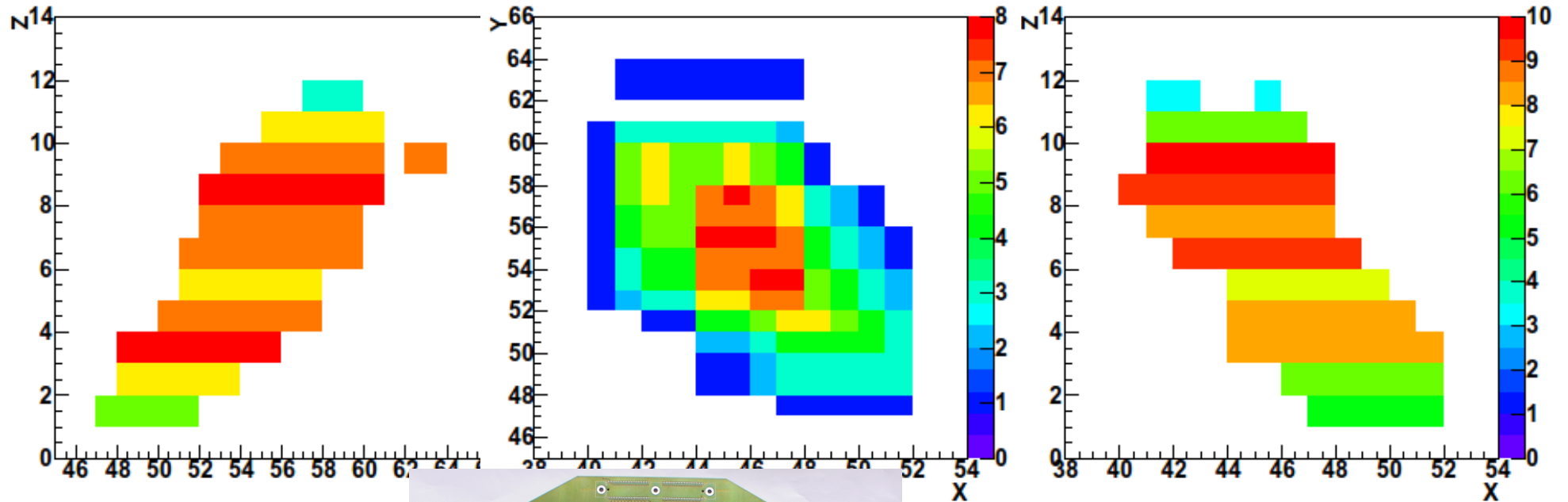


J-P. Mols et al.  
October 2009

# Electron – Recoil Discrimination ( $^4\text{He}$ at 350 mbar)



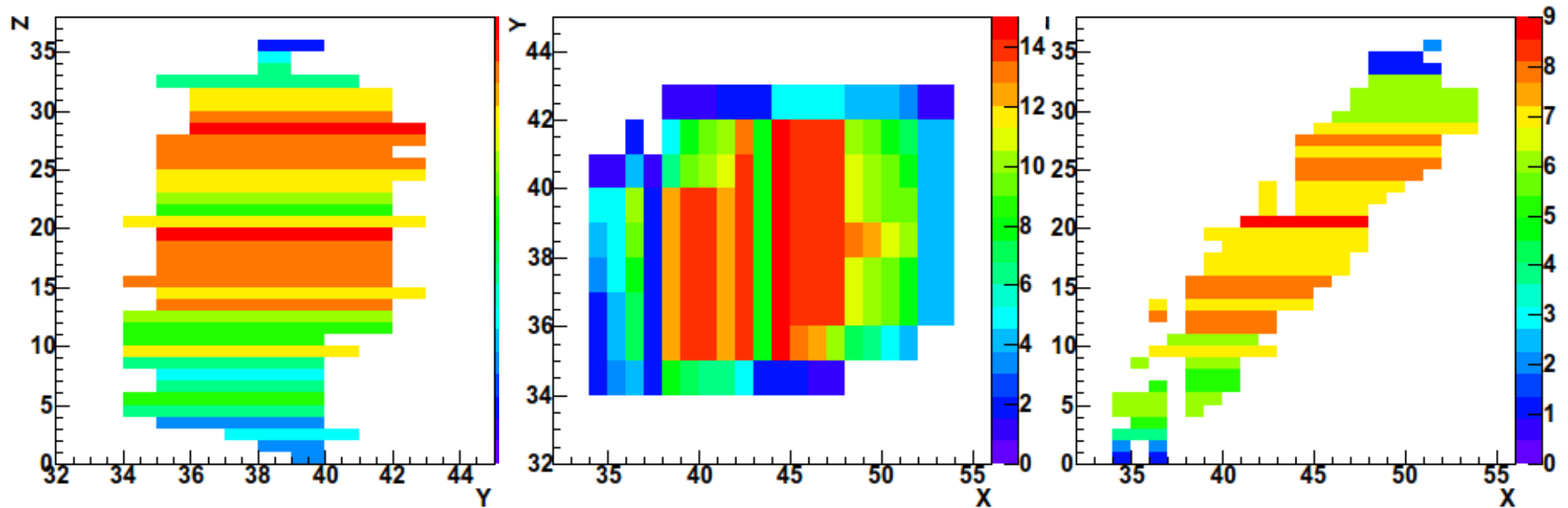
# 3D Proton recoil track in $C_4H_{10}$ (100 keV in 50 mbar)



MIMAC electronics  
J.P. Richer et al.  
(2010)

D. Santos (LPSC Grenoble)

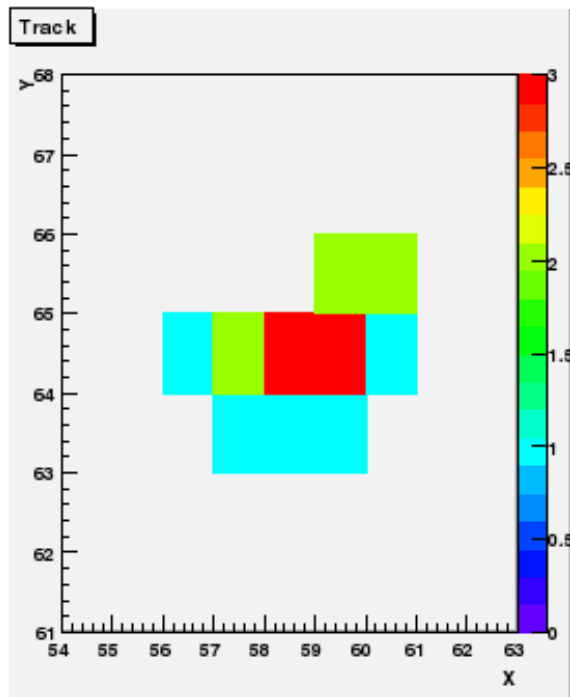
# 3D Proton recoil track in $^4\text{He}$ (100 keV in 350 mbar)



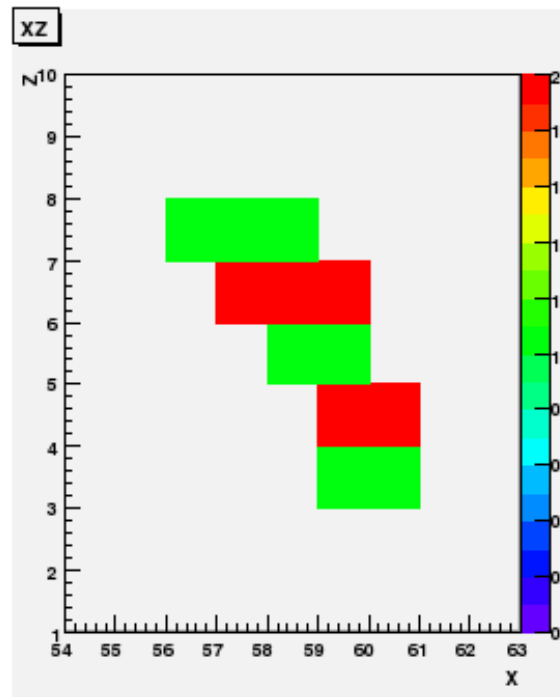
# 6 keV recoil track ( $^4\text{He}$ ) projections

300 mbar (95% of  $4\text{He}$ , 5% of  $\text{C}_4\text{H}_{10}$ )

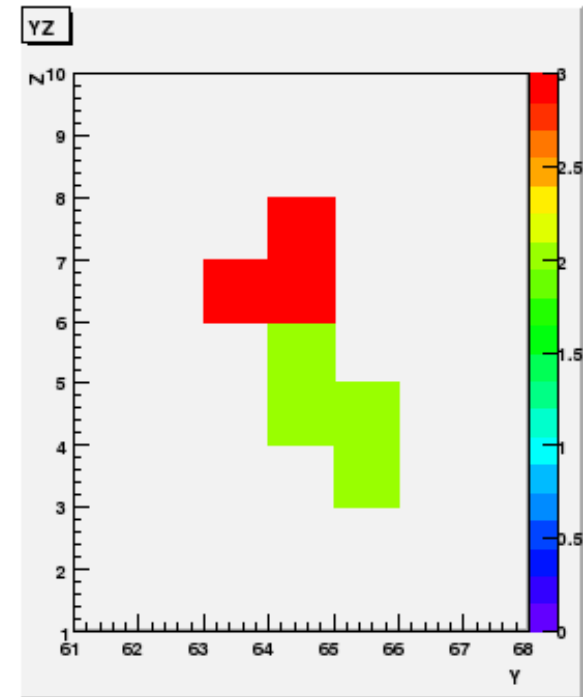
X-Y



X-Z

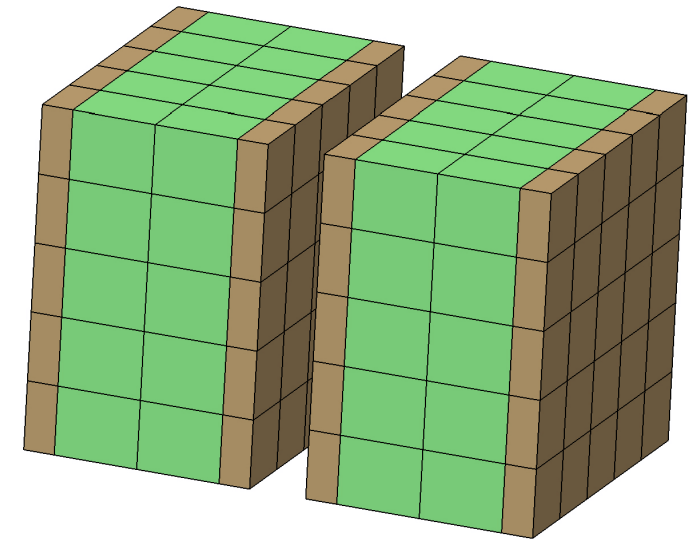
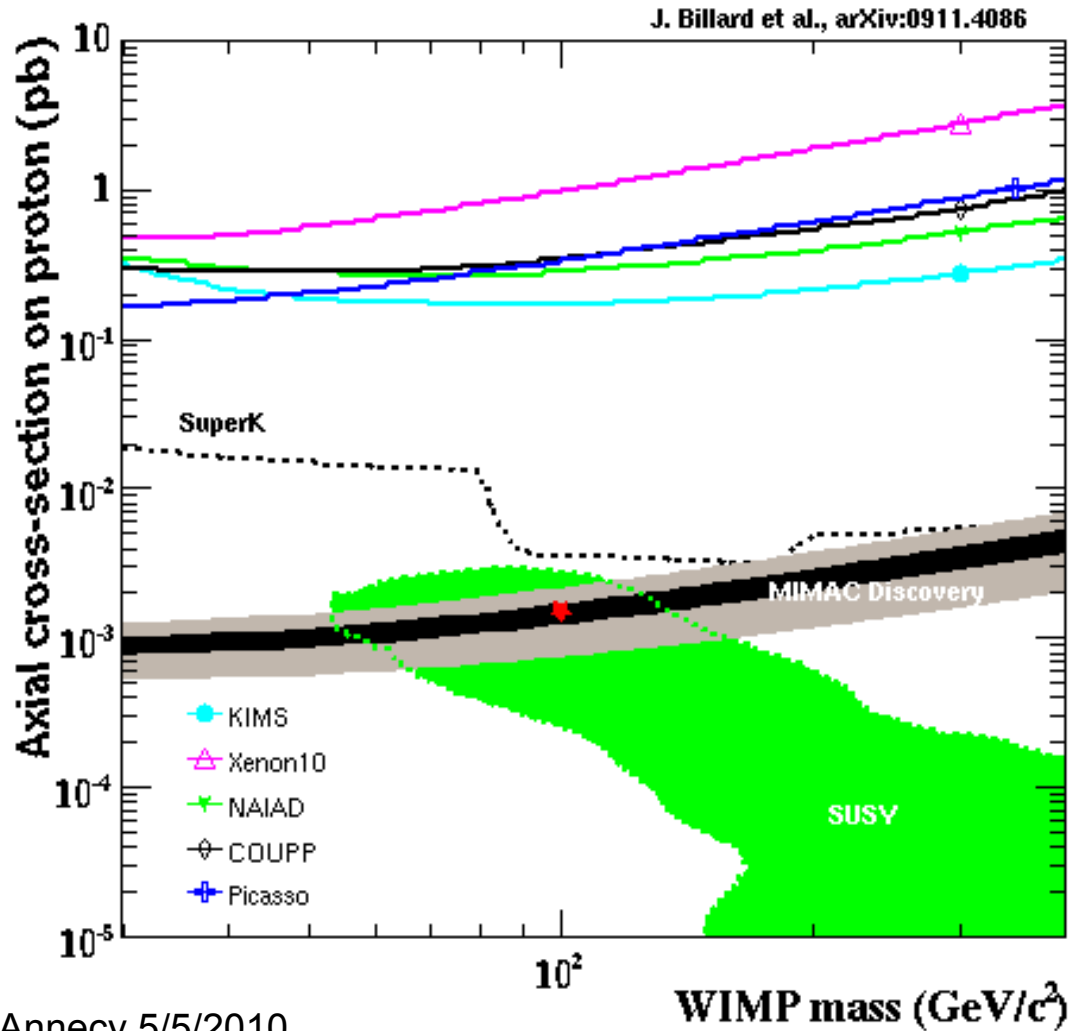
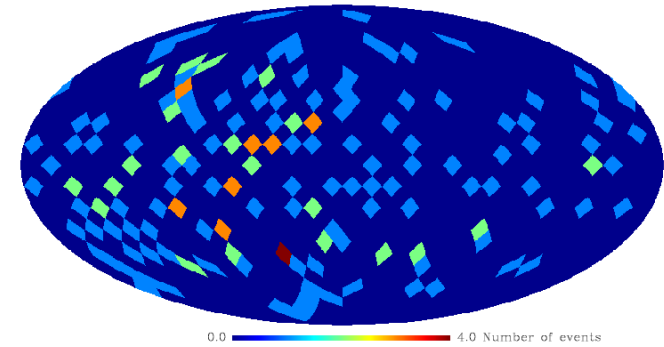


Y-Z





# « Discovery » curve (50 m<sup>3</sup> CF<sub>4</sub> at 50 mbars)



1 m<sup>3</sup>

D. Santos (LPSC Grenoble)

# MIMAC : recoil track measurements

April 2009

@ IRSN Cadarache



Amande facility :

- Neutron field with energies down to a few keV