



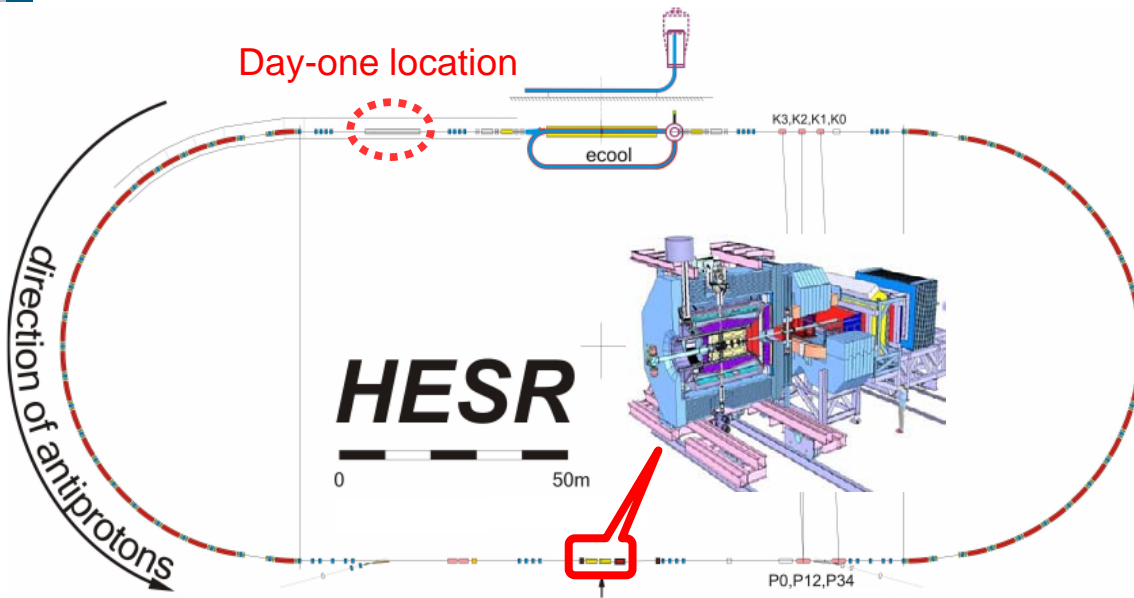
Darmstadt, Jun. 24-28 2013



# Status of day-one experiment commissioning at COSY

Huagen Xu

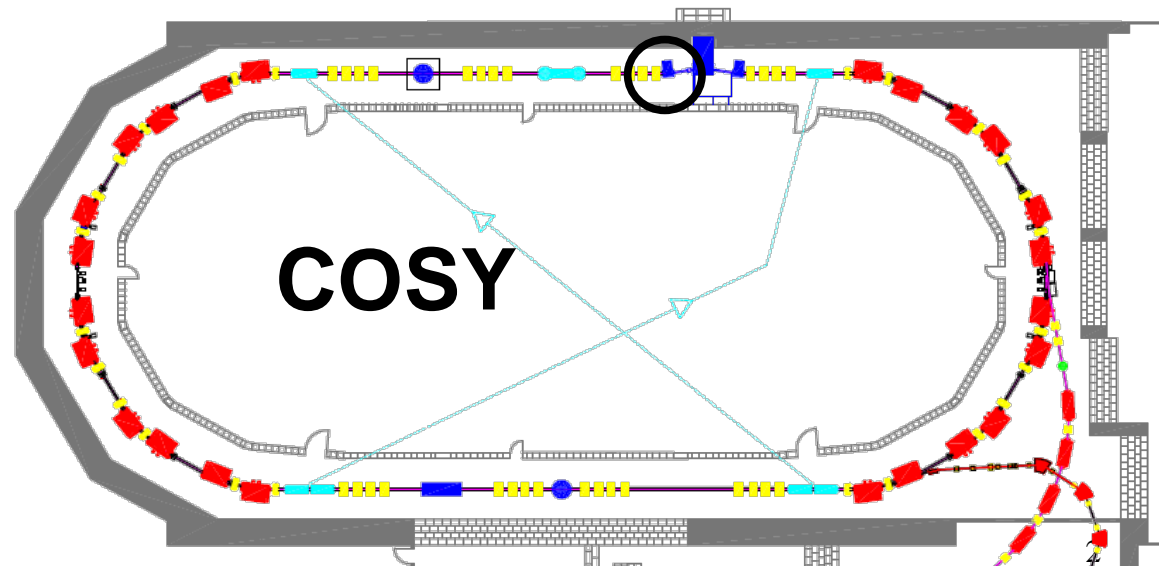
# Goals of day-one experiment at HESR



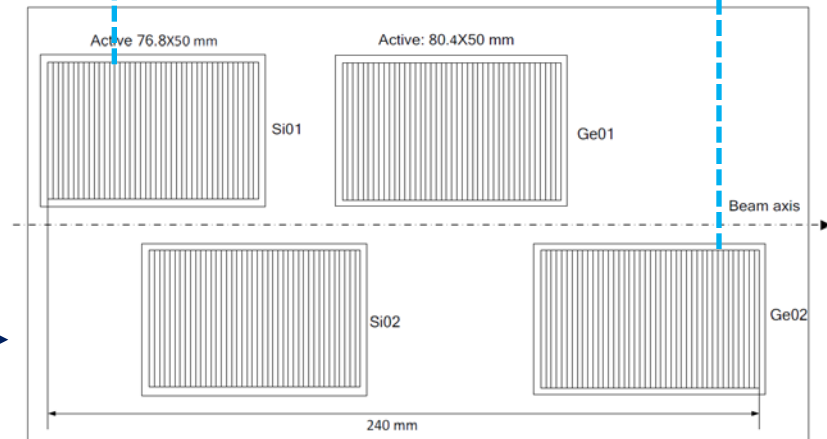
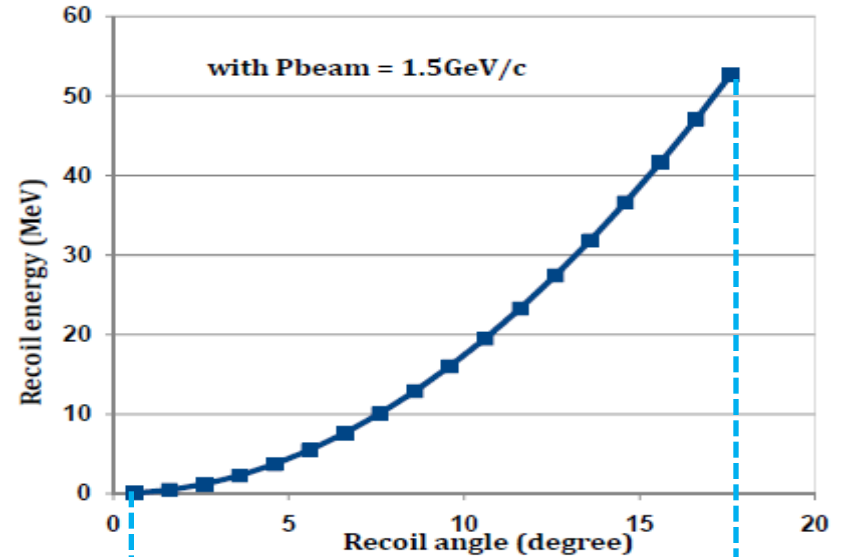
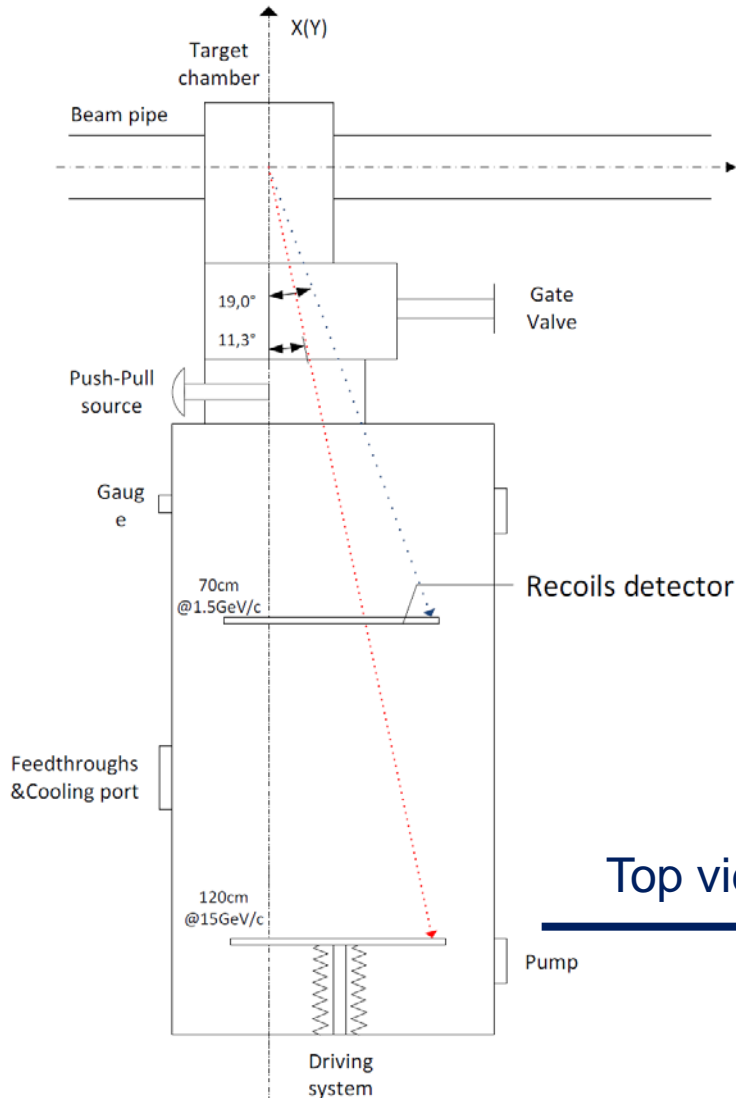
- Pbarp elastic scattering
- Coincidence (forward&recoil)
- Large range of  $t$  :  $0.0008-0.1 \text{ GeV}^2$

- Test method
- Recoil arm construction
- Commissioning at COSY

## Cluster target at ANKE



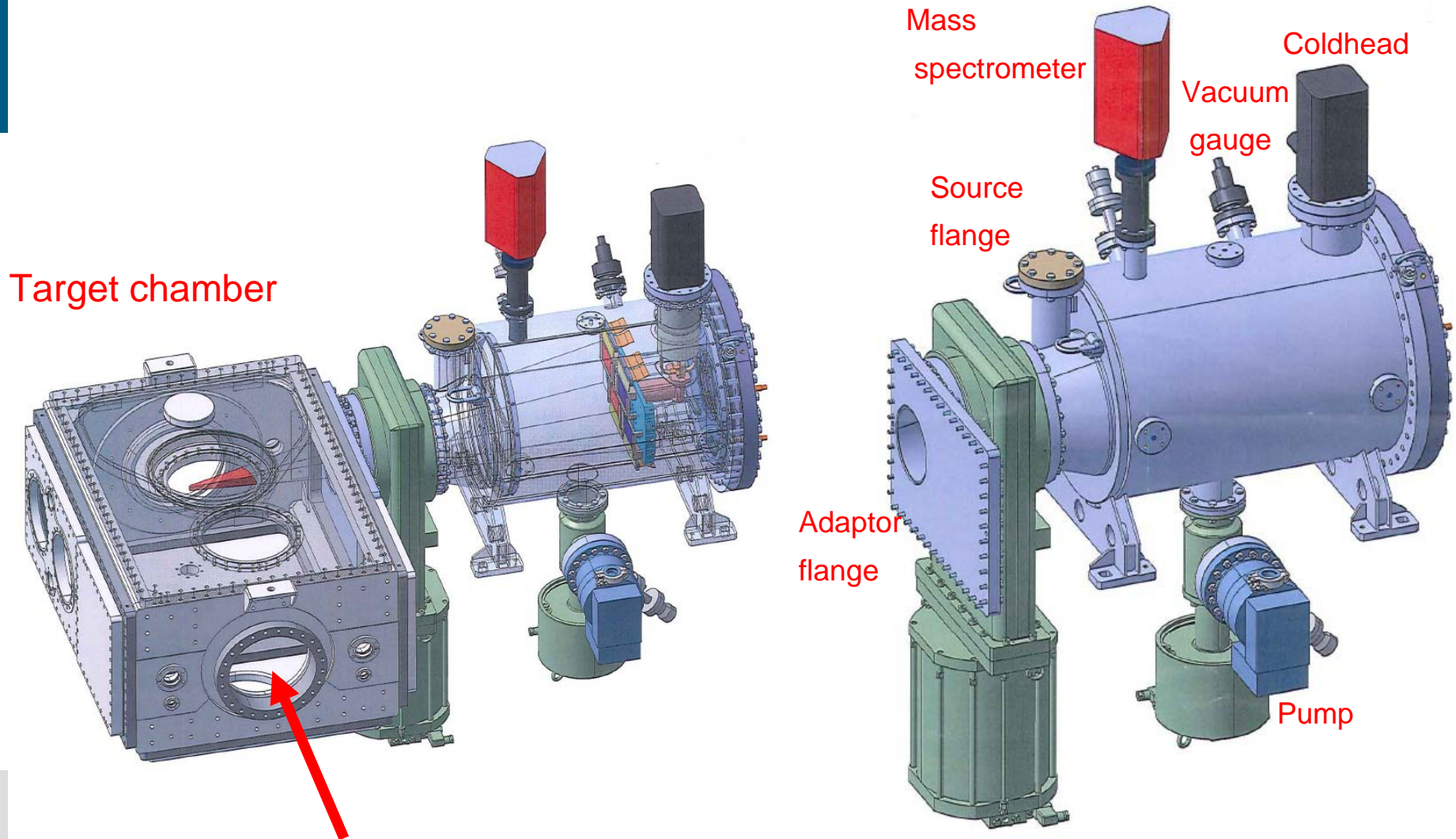
# Recoil Arm



Fixed plane for commissioning

- Si : 76.8 x 50 x 1 (mm) (1.2 mm pitch)
- Ge: 80.4 x 50 x 5/11 (mm) (1.2mm pitch)<sup>3</sup>

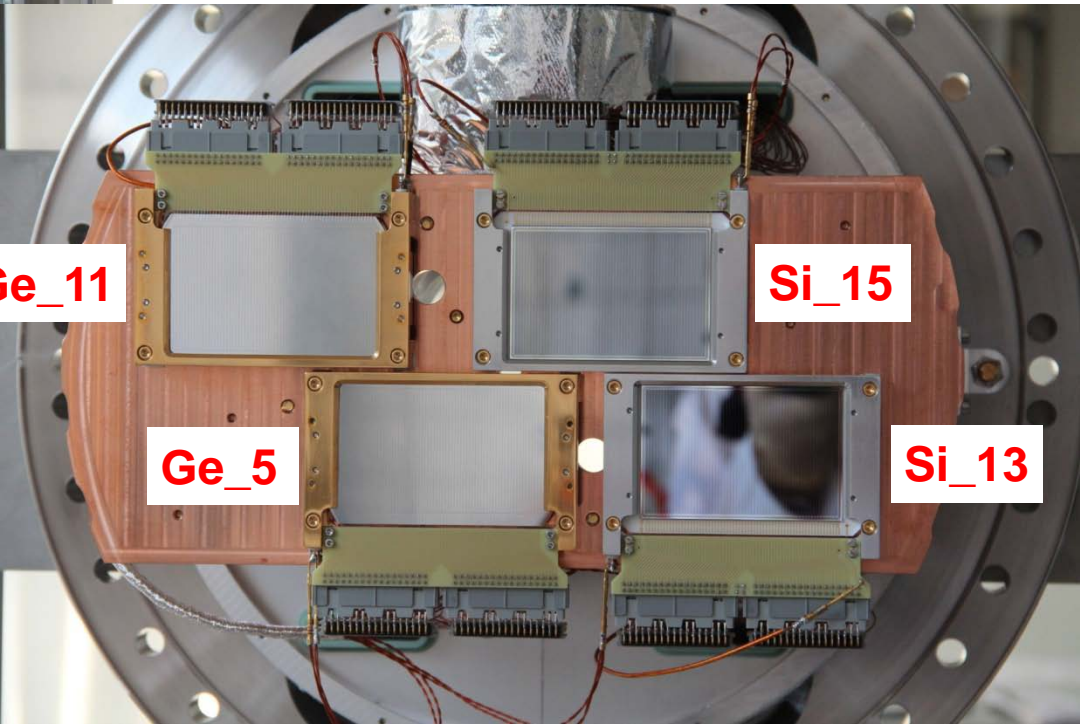
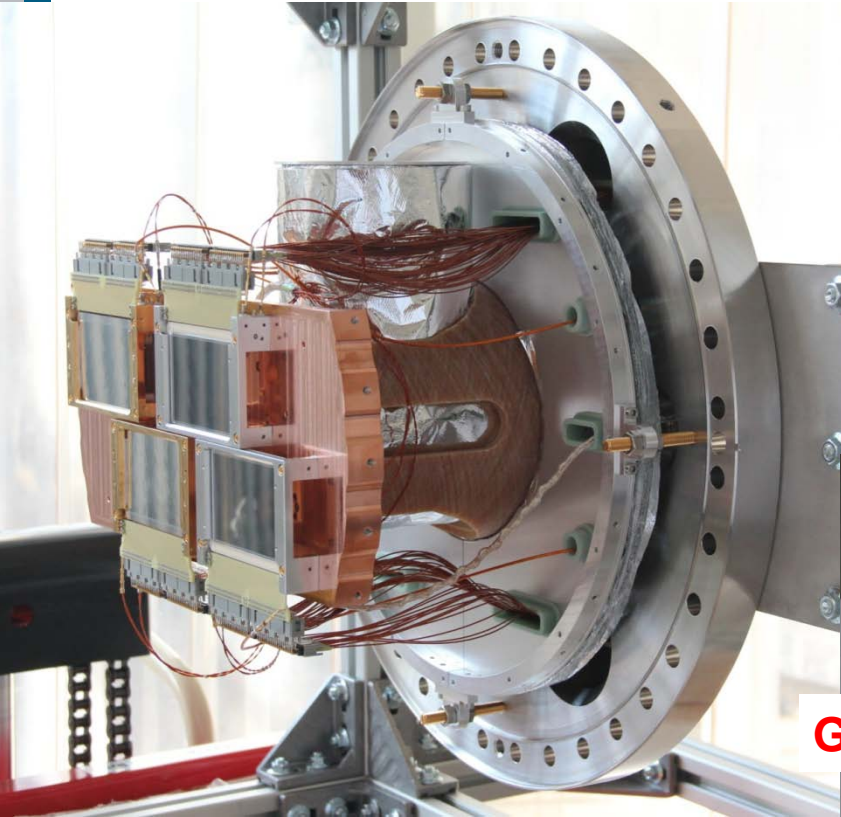
# Drawings of day-one chamber for commissioning





# Final assembly

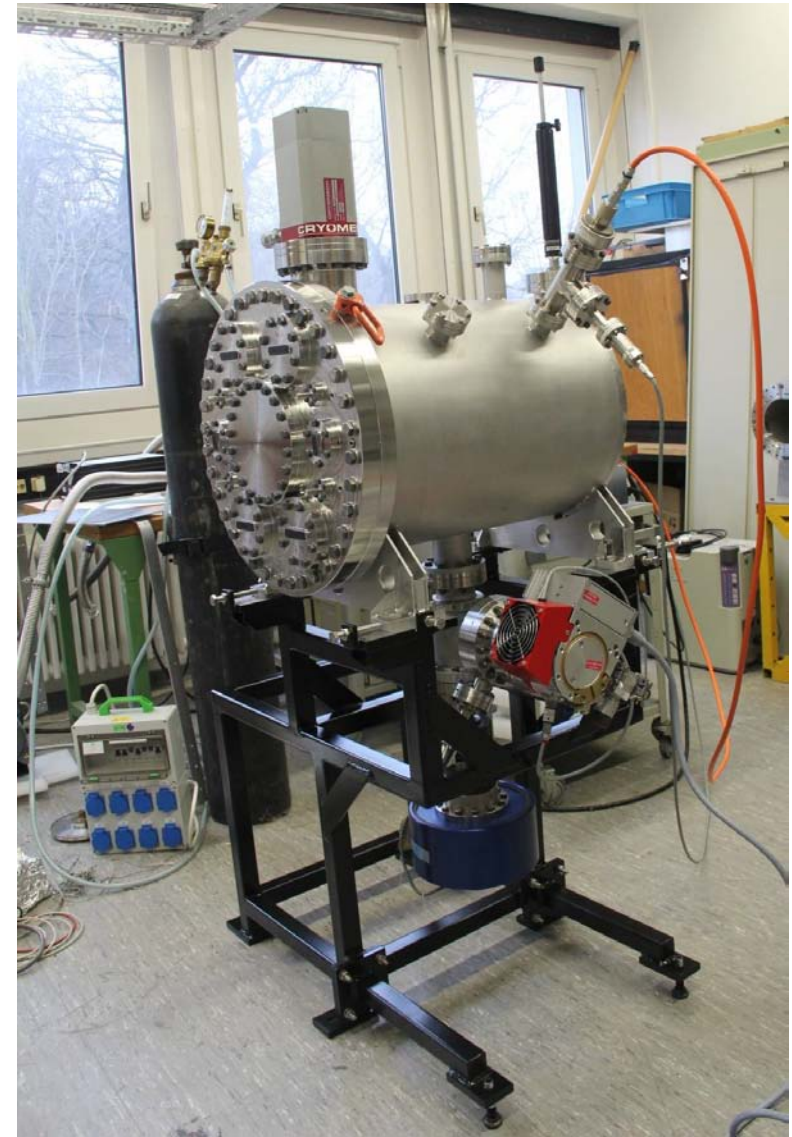
Detectors on cold-plate



**Arriving at lab after assembly**

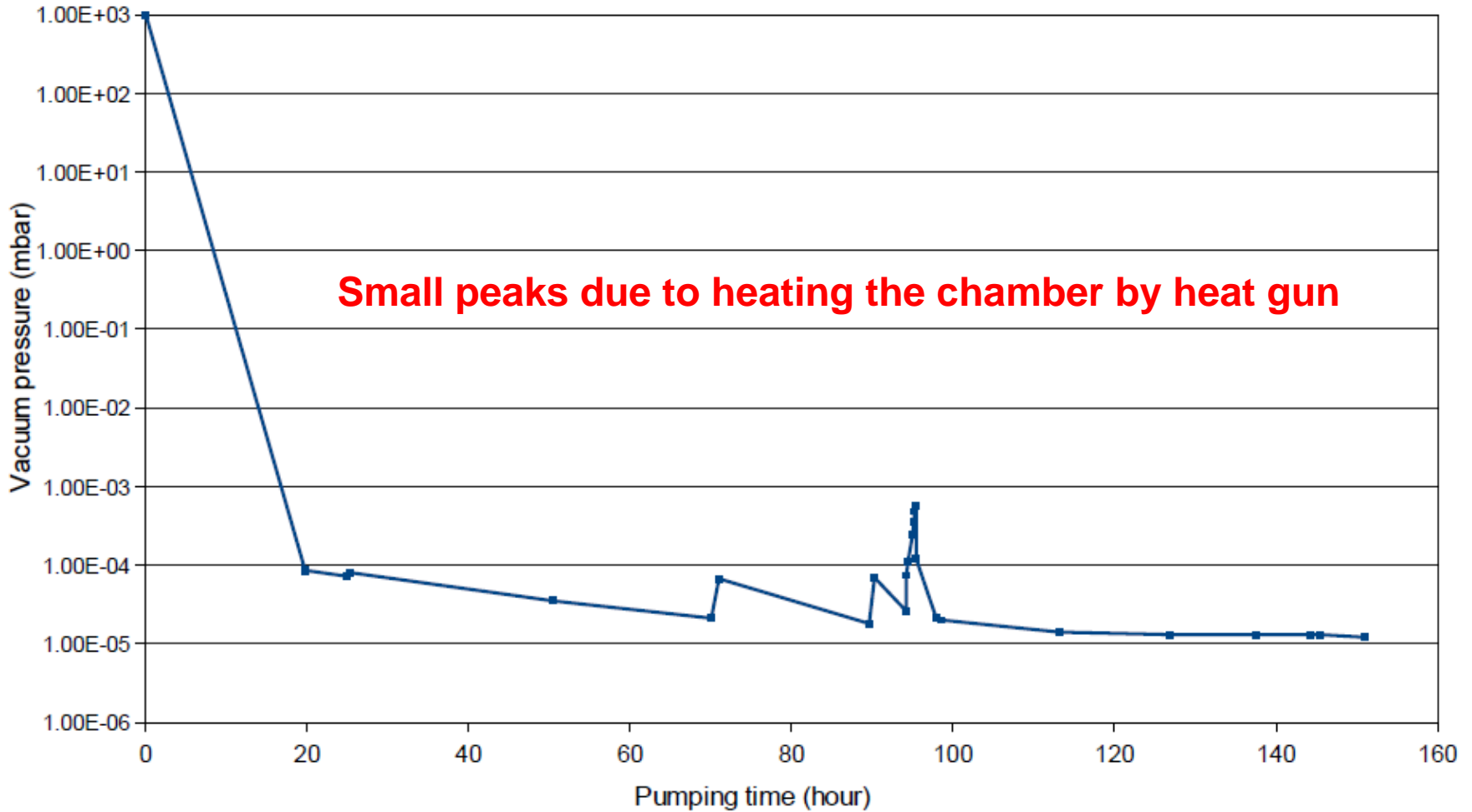


**Pumps and valve added**

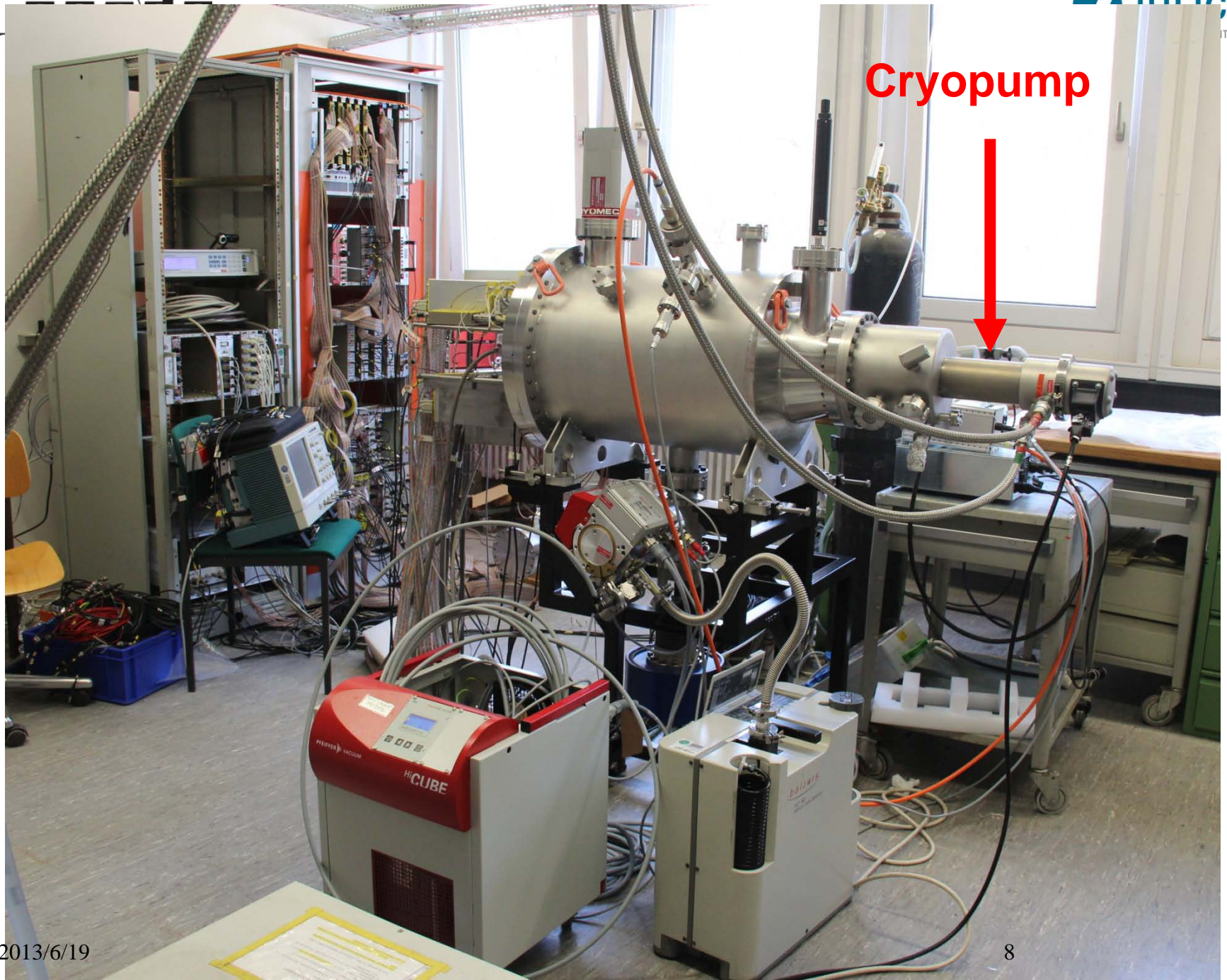


# Long pumping time needed

Vacuum pressure v.s. pumping time



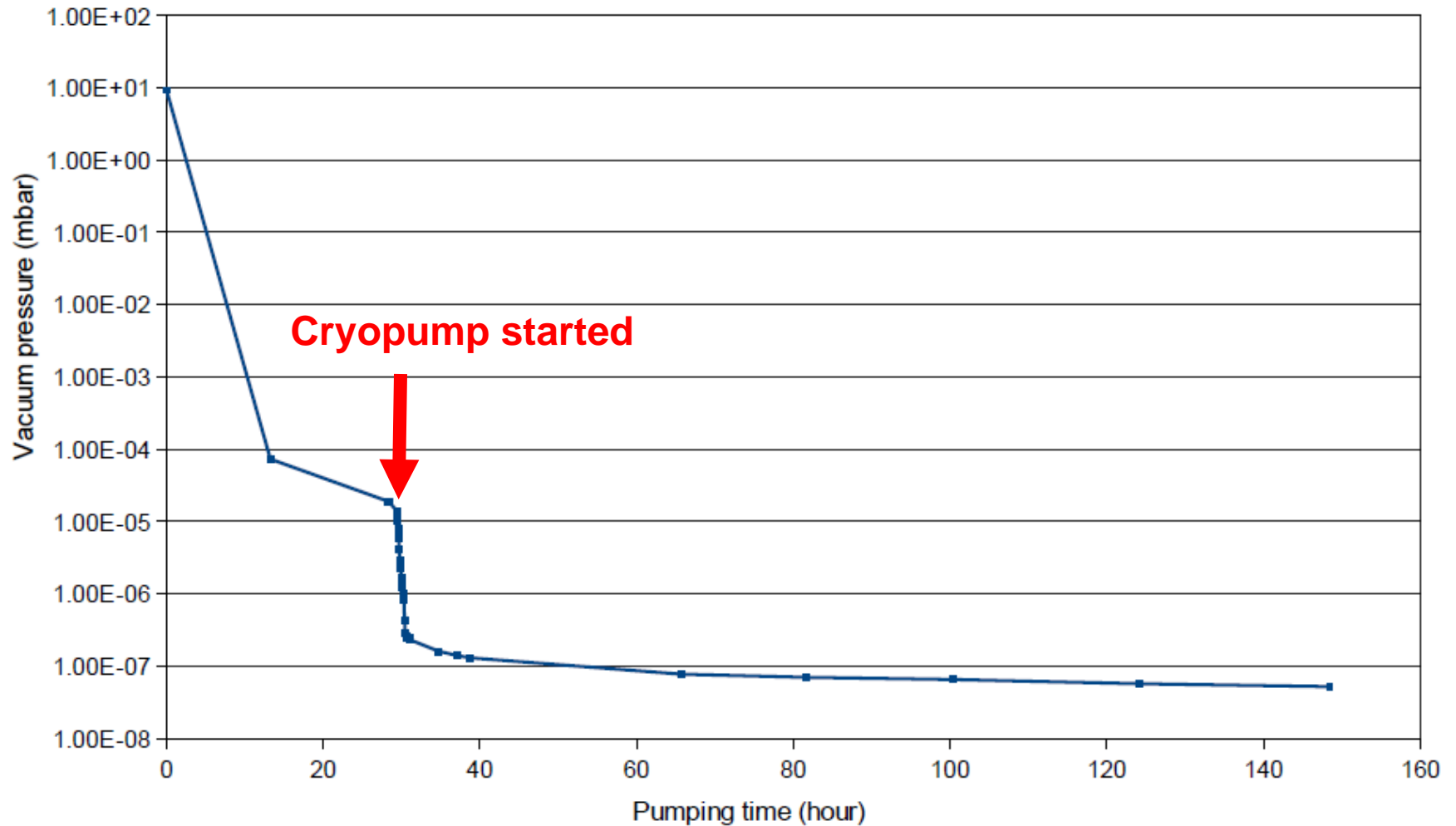




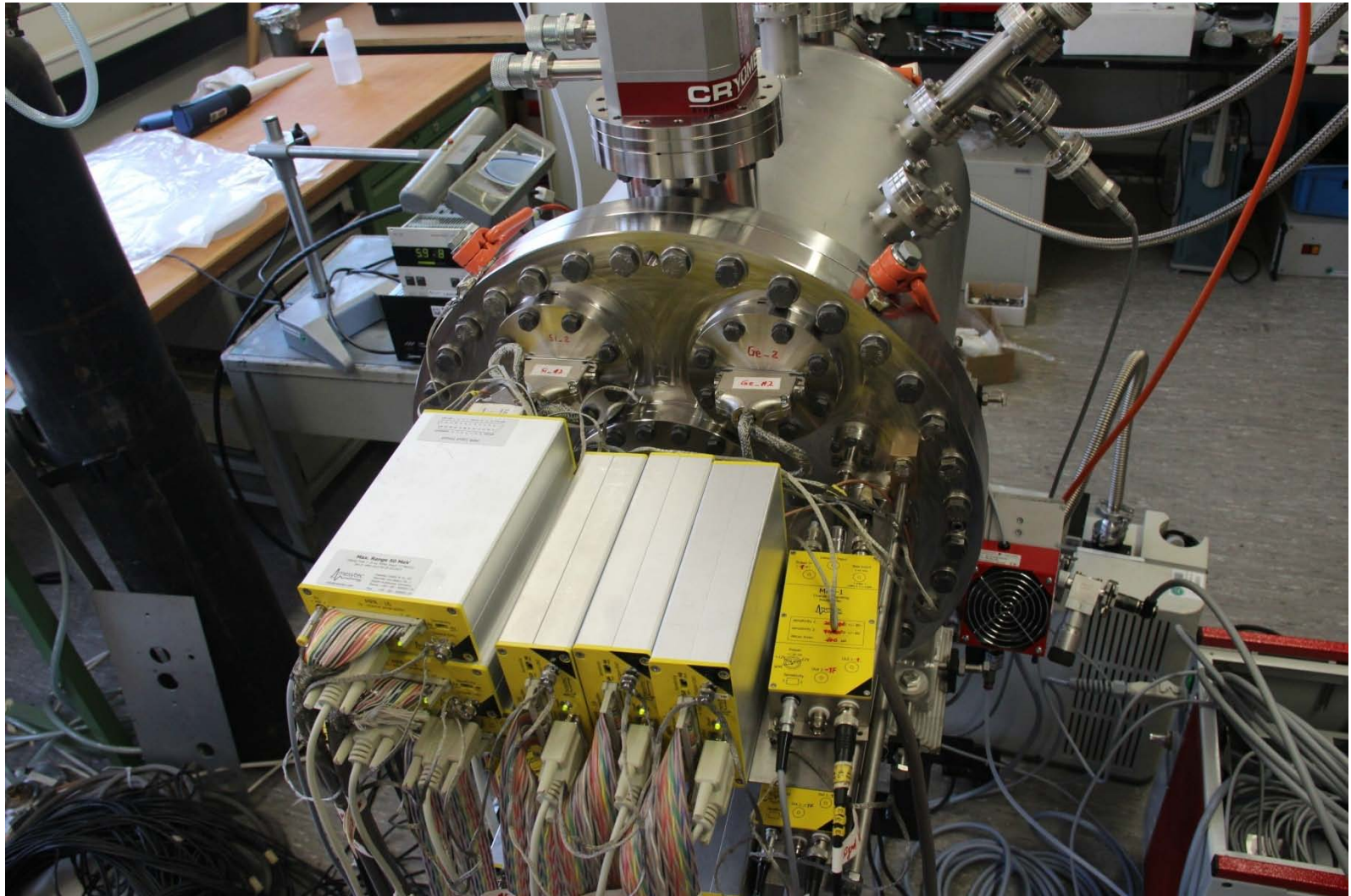


# Cryopump has been added

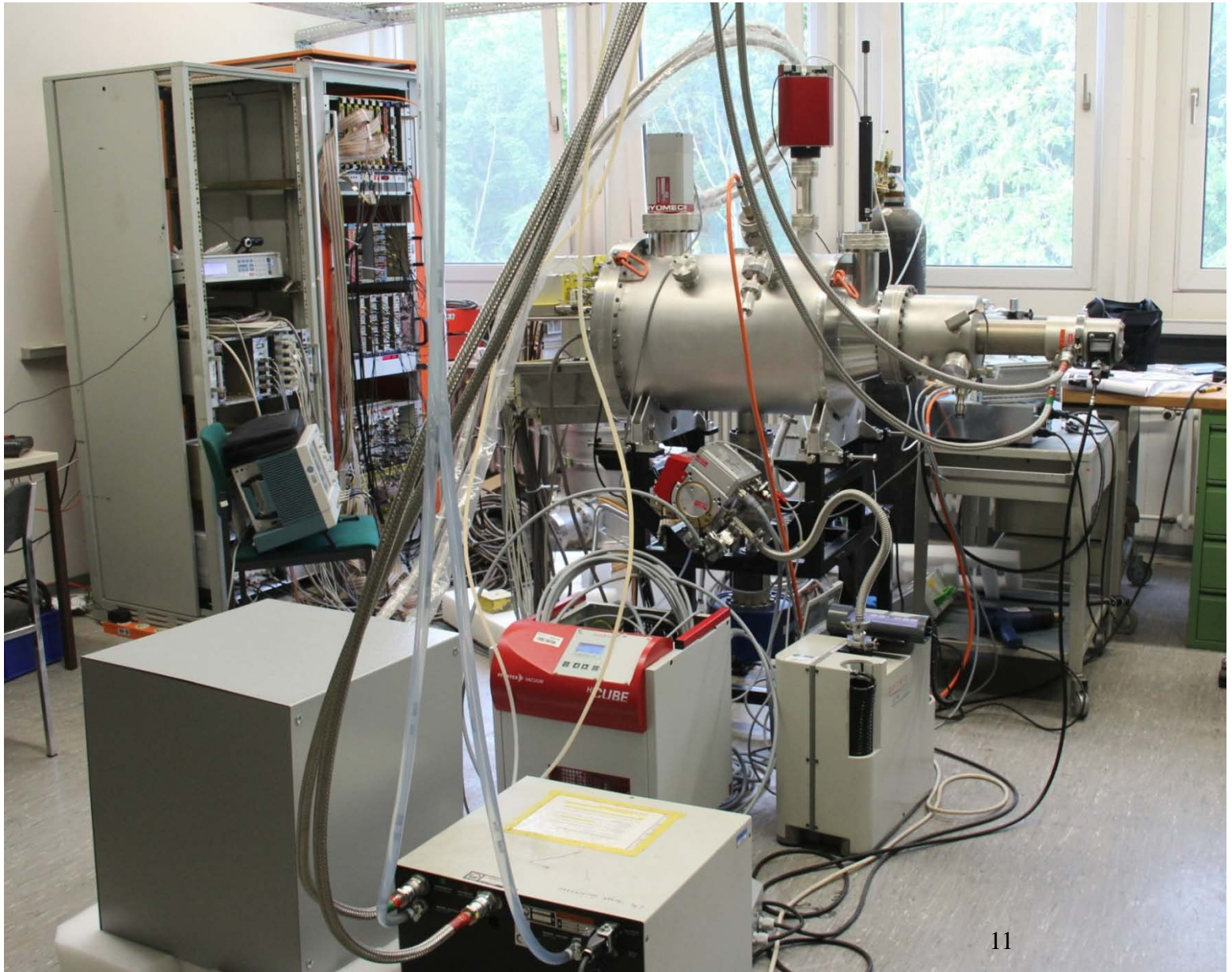
Vacuum pressure v.s. pumping time



# Preamplifiers connected

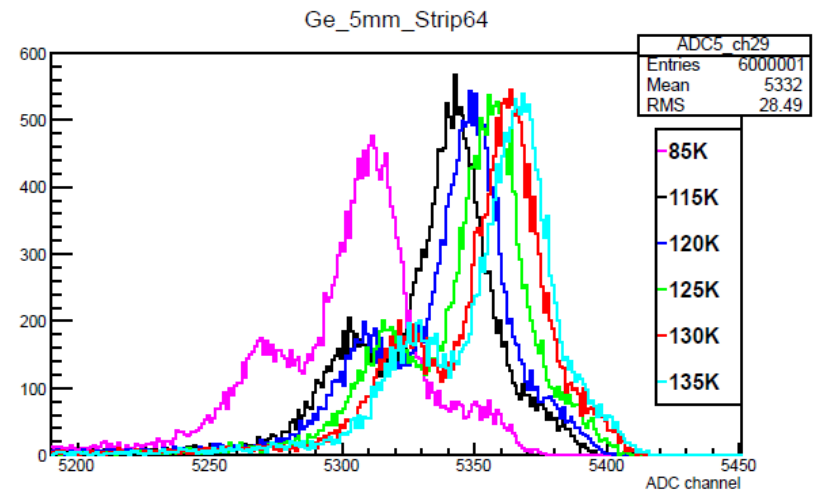
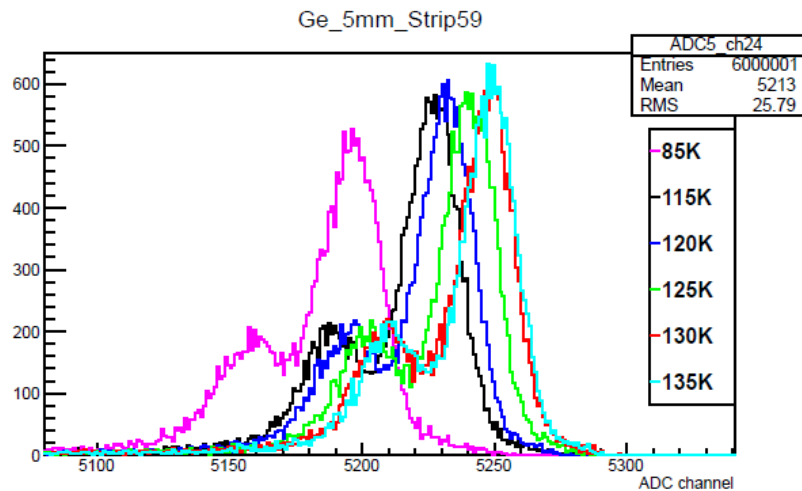
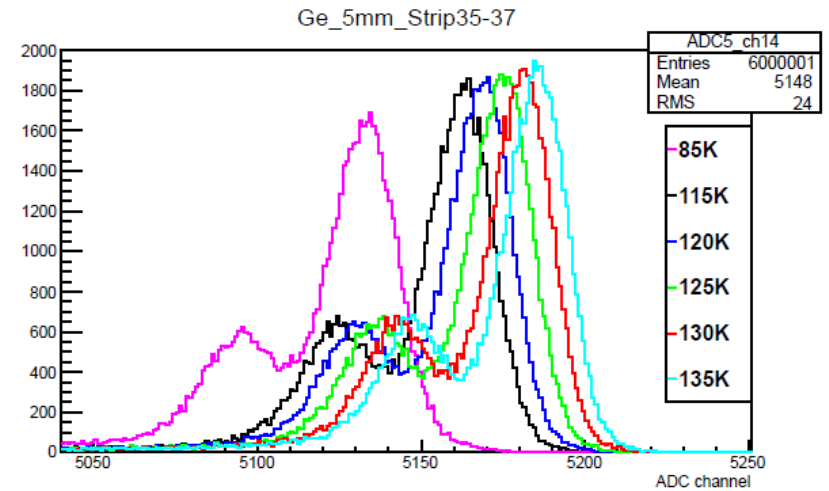
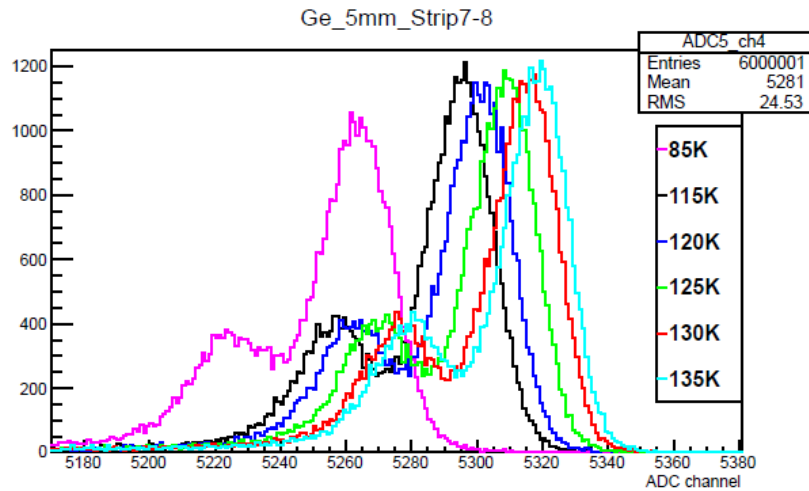




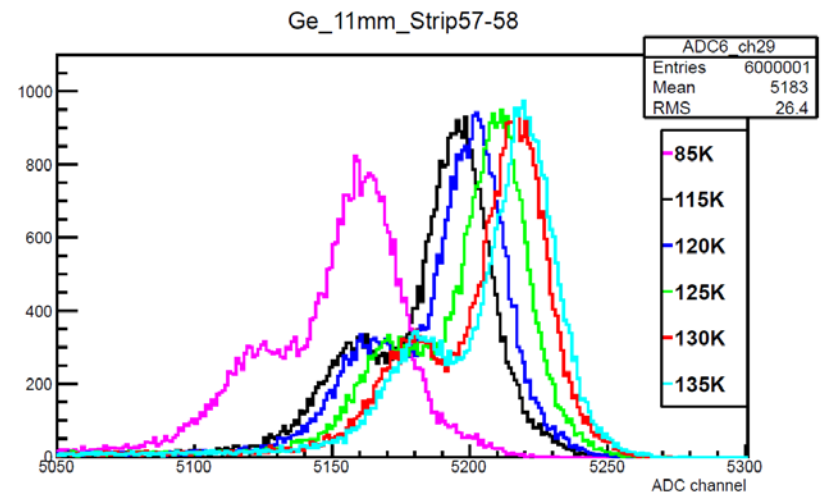
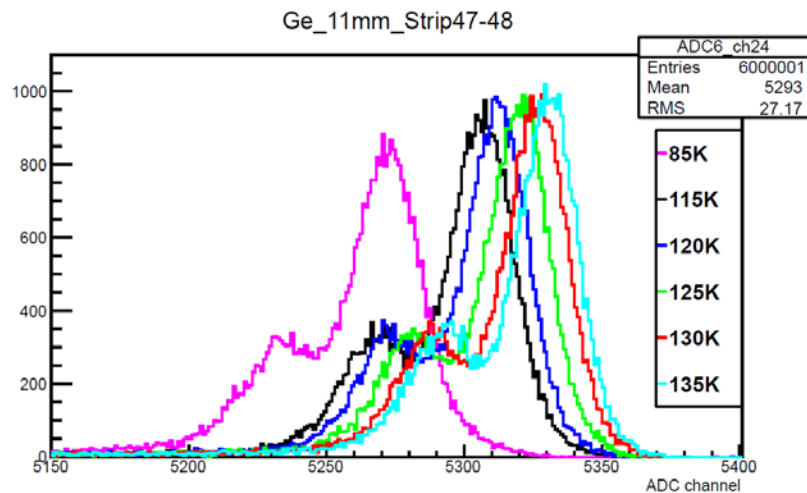
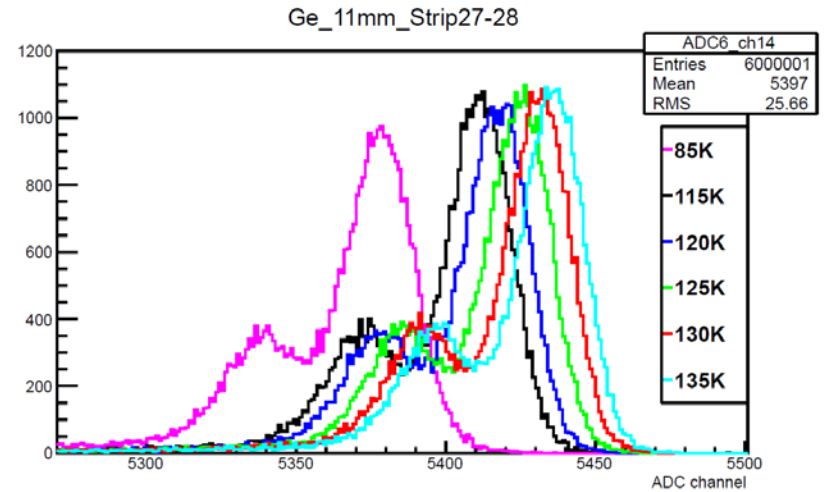
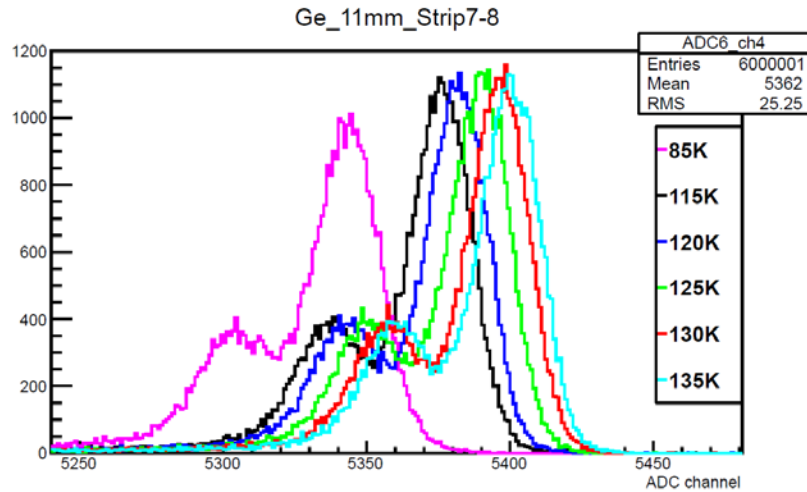




## Sample strips of Ge\_5 (Cm244 source spectrum)

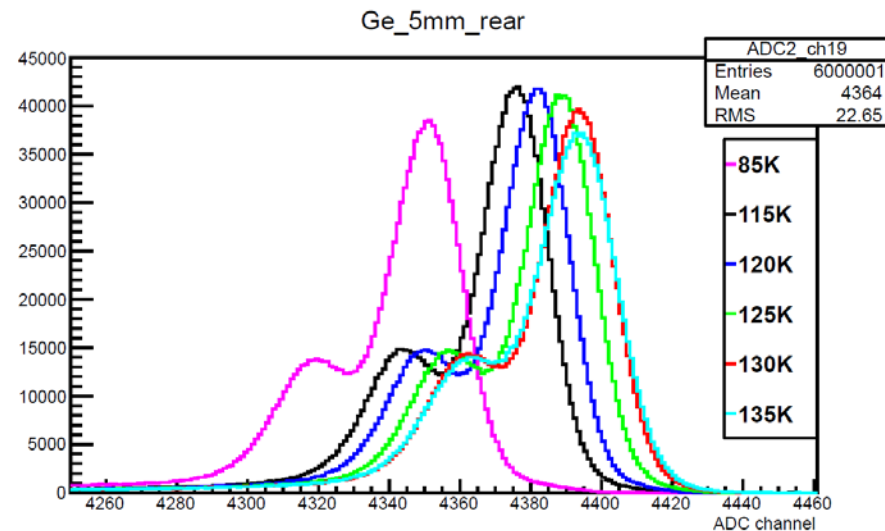
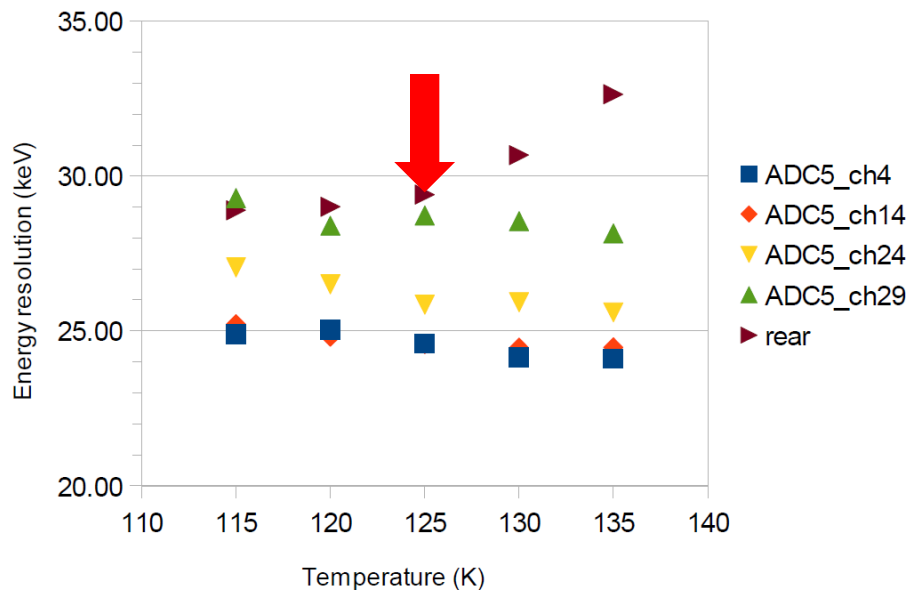


# Sample strips of Ge<sub>11</sub>

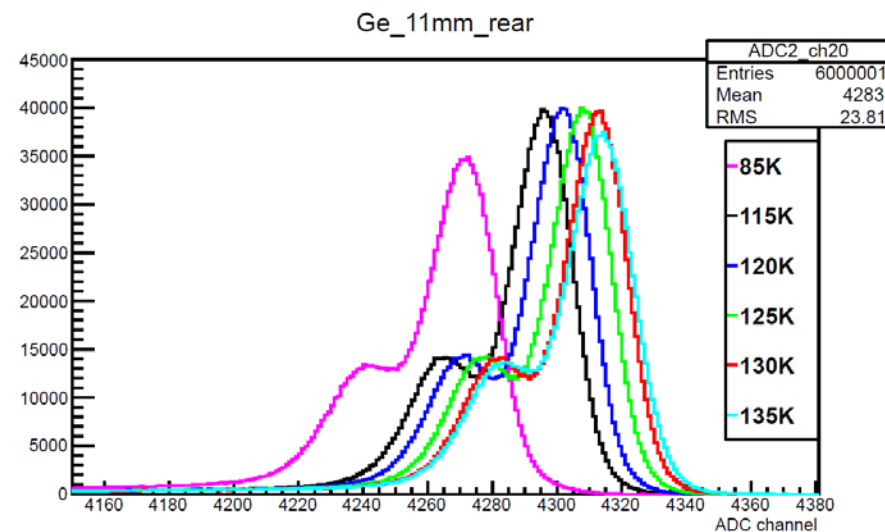
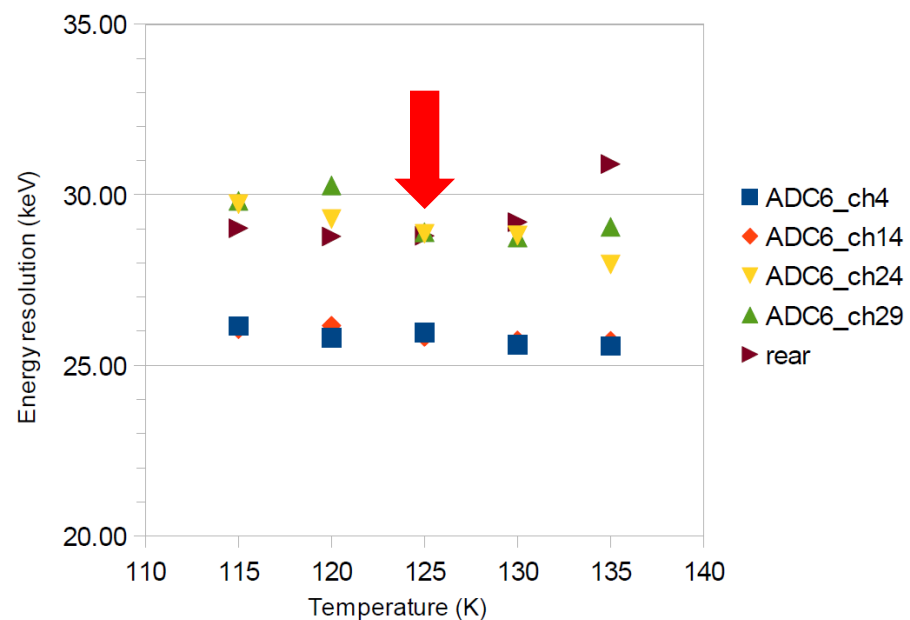


Temperature vs resolution (Ge\_5)

# 125K seems to be the optimized temperature

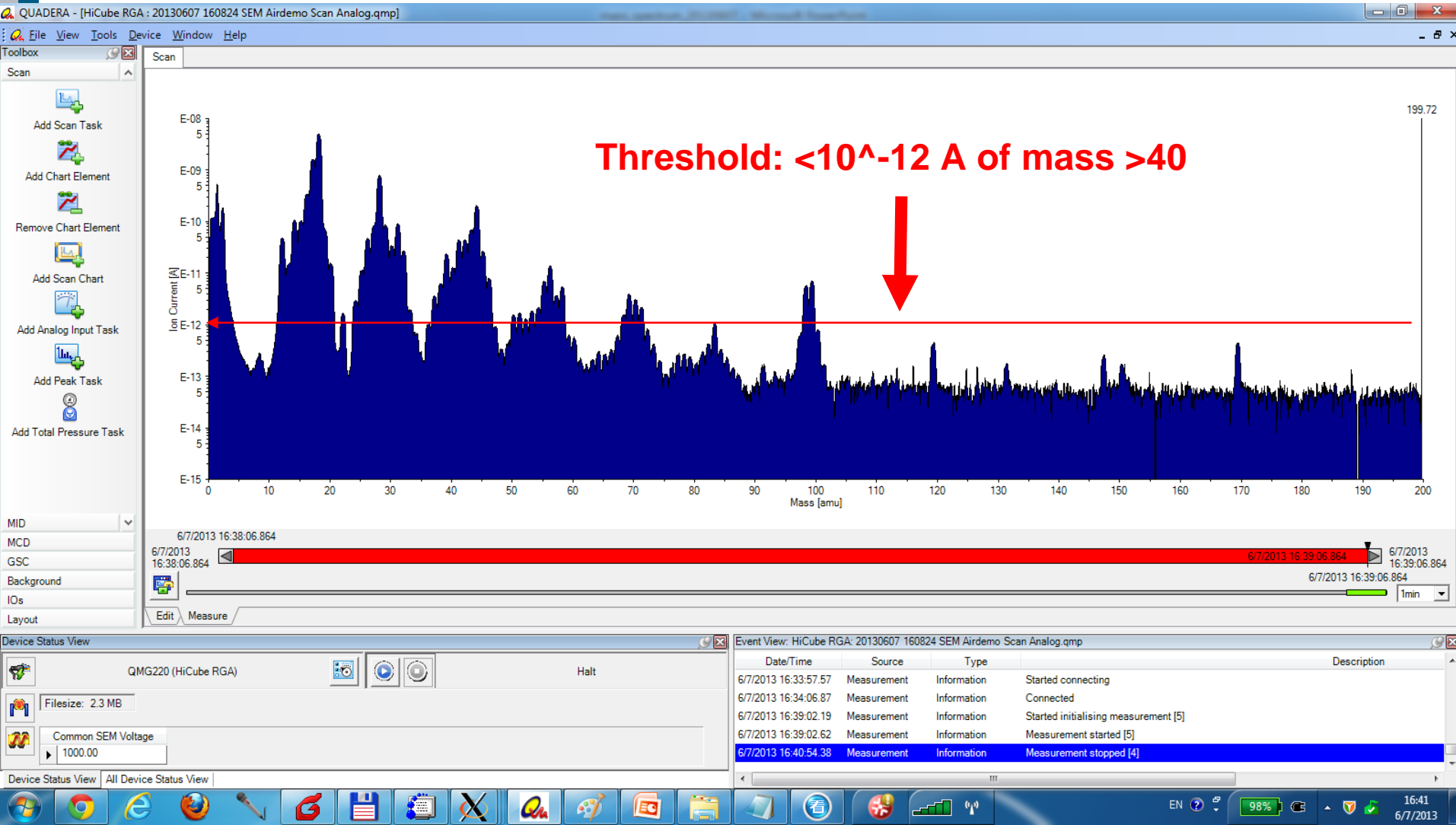


Temperature vs resolution (Ge\_11)

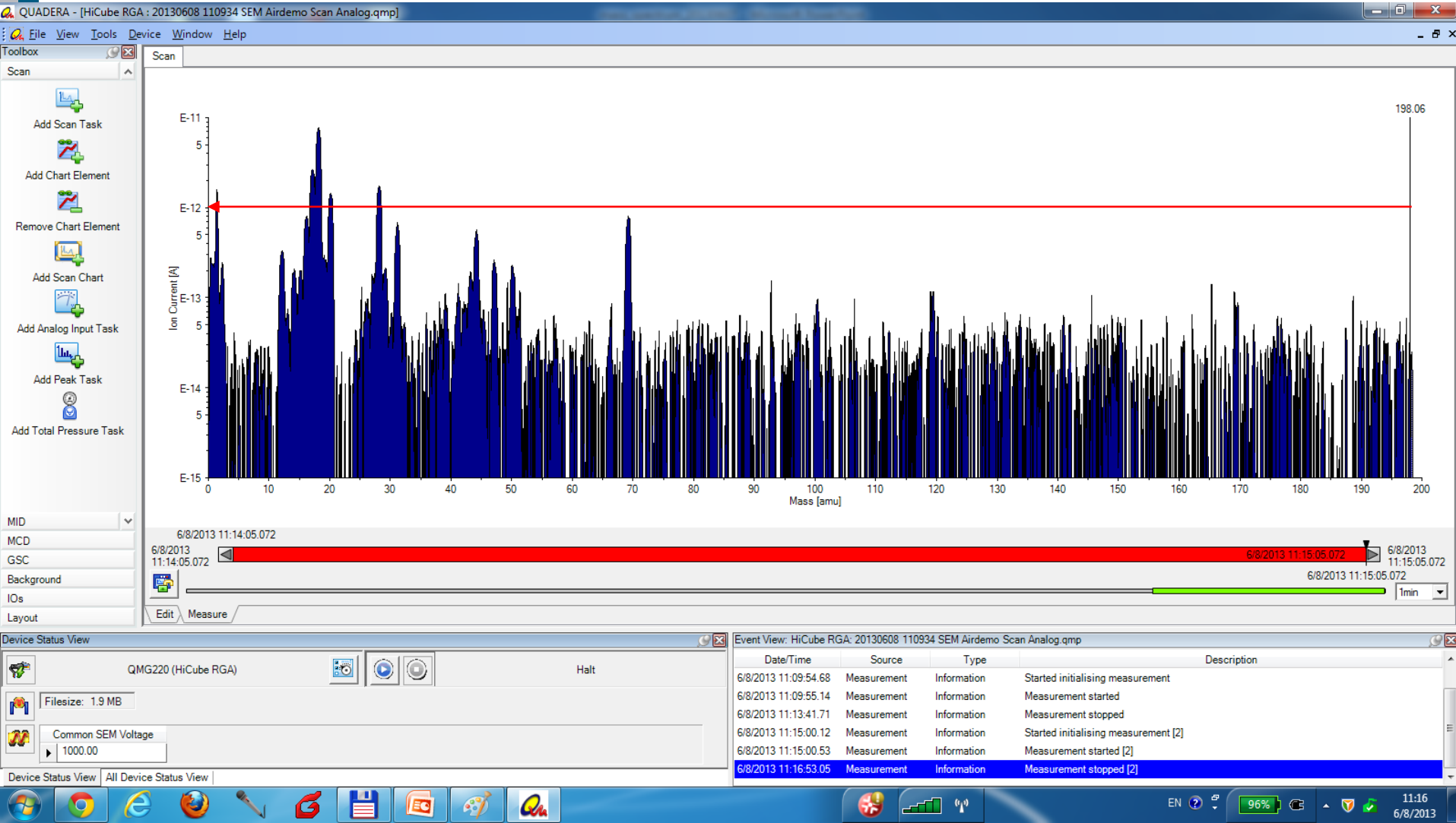




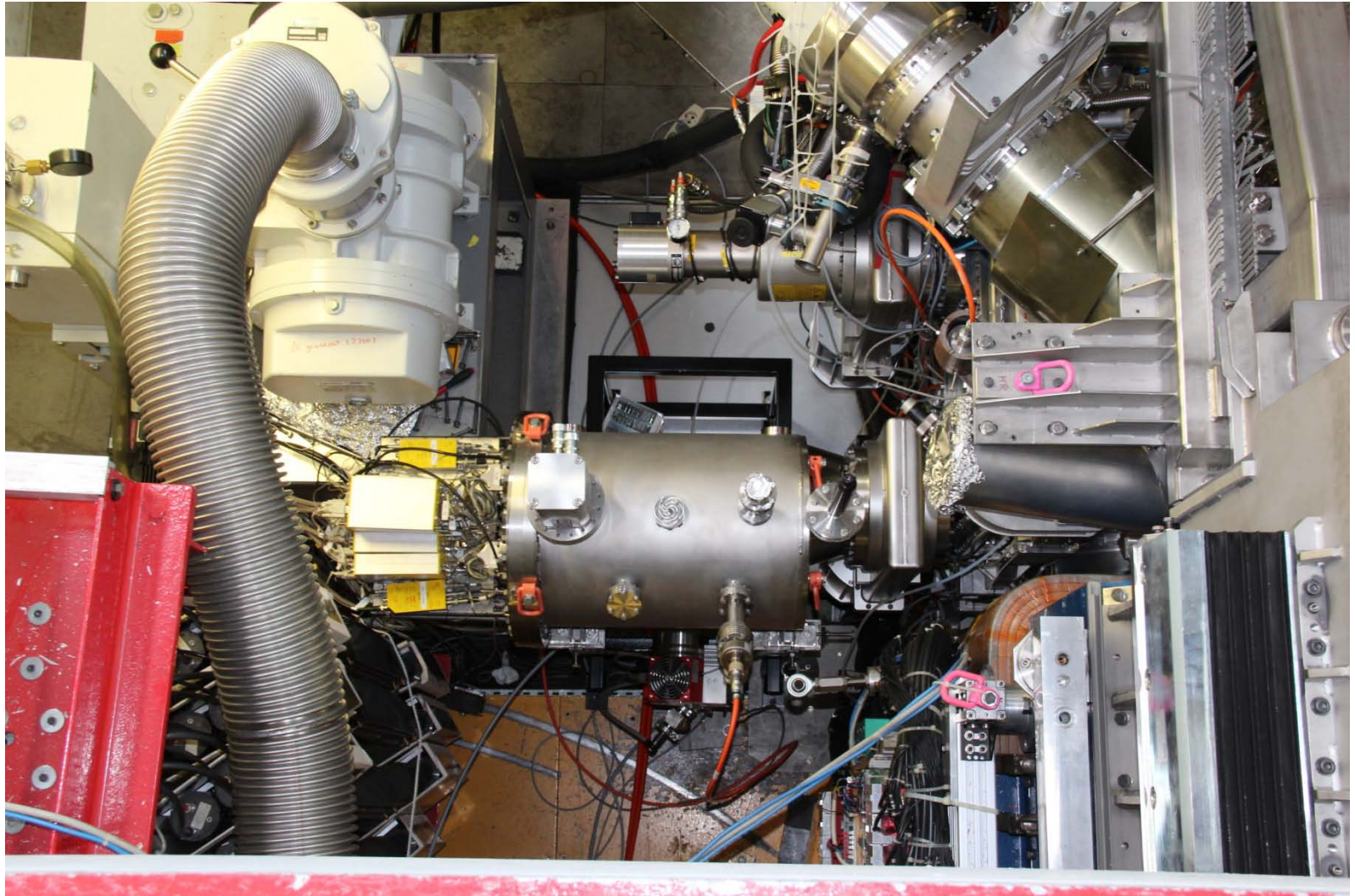
mass spectrum at 1.9e-5mbar, room temperature  
on Jun.07, 2013



# Mass spectrum when cryopump on, at 4.1e-8mbar on Jun. 8, 2013

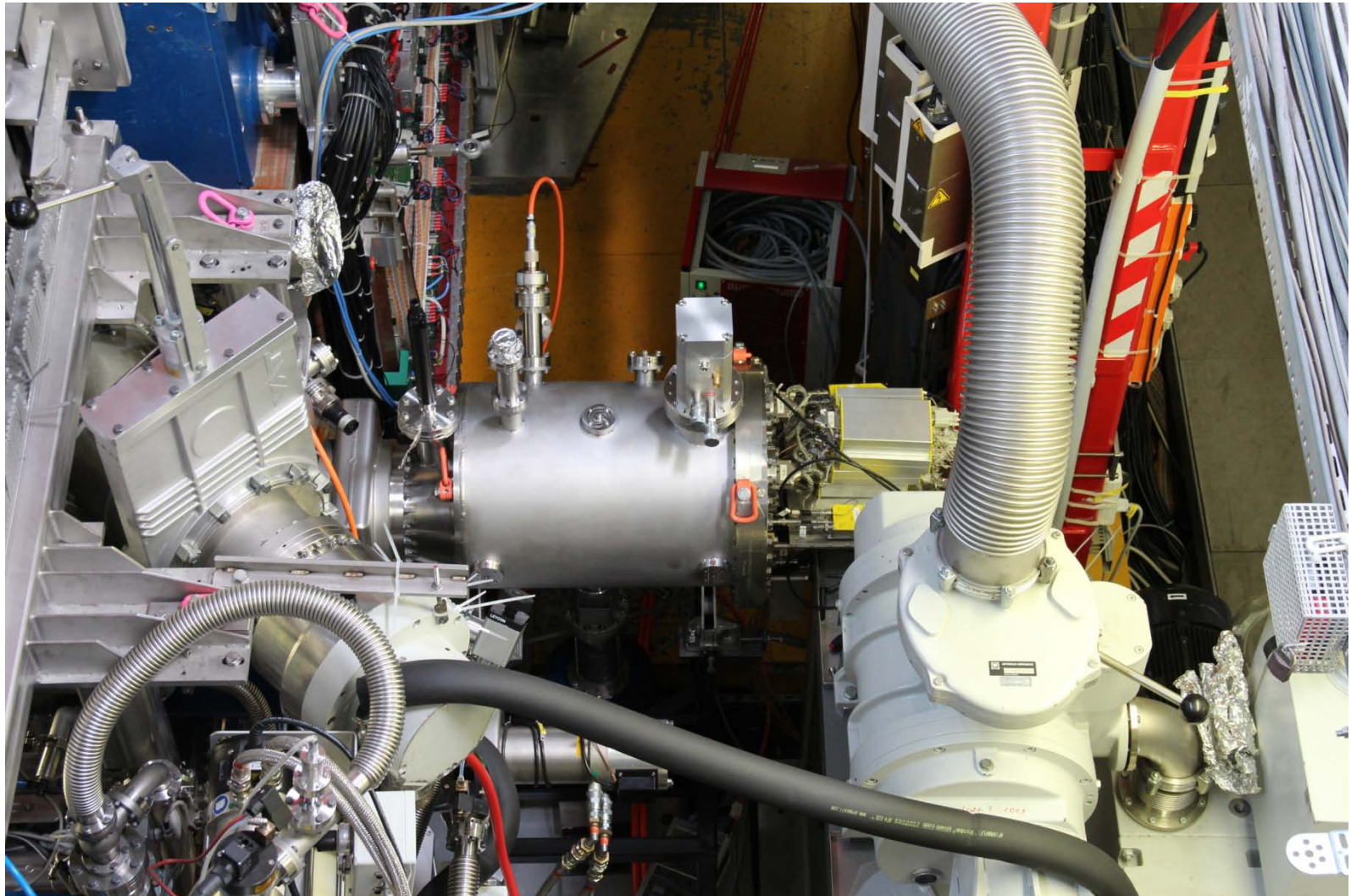


## Installation at ANKE



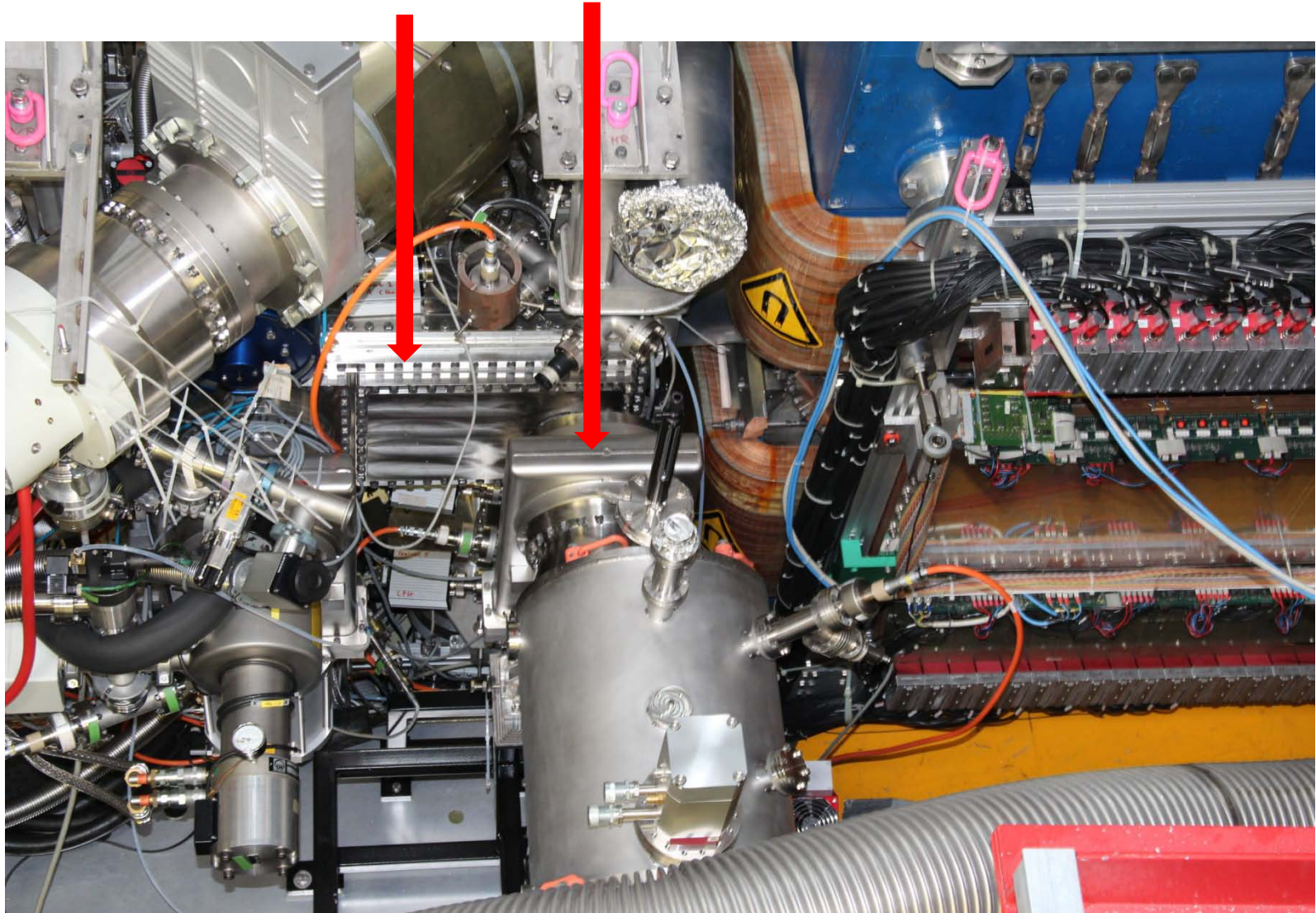


# One more picture

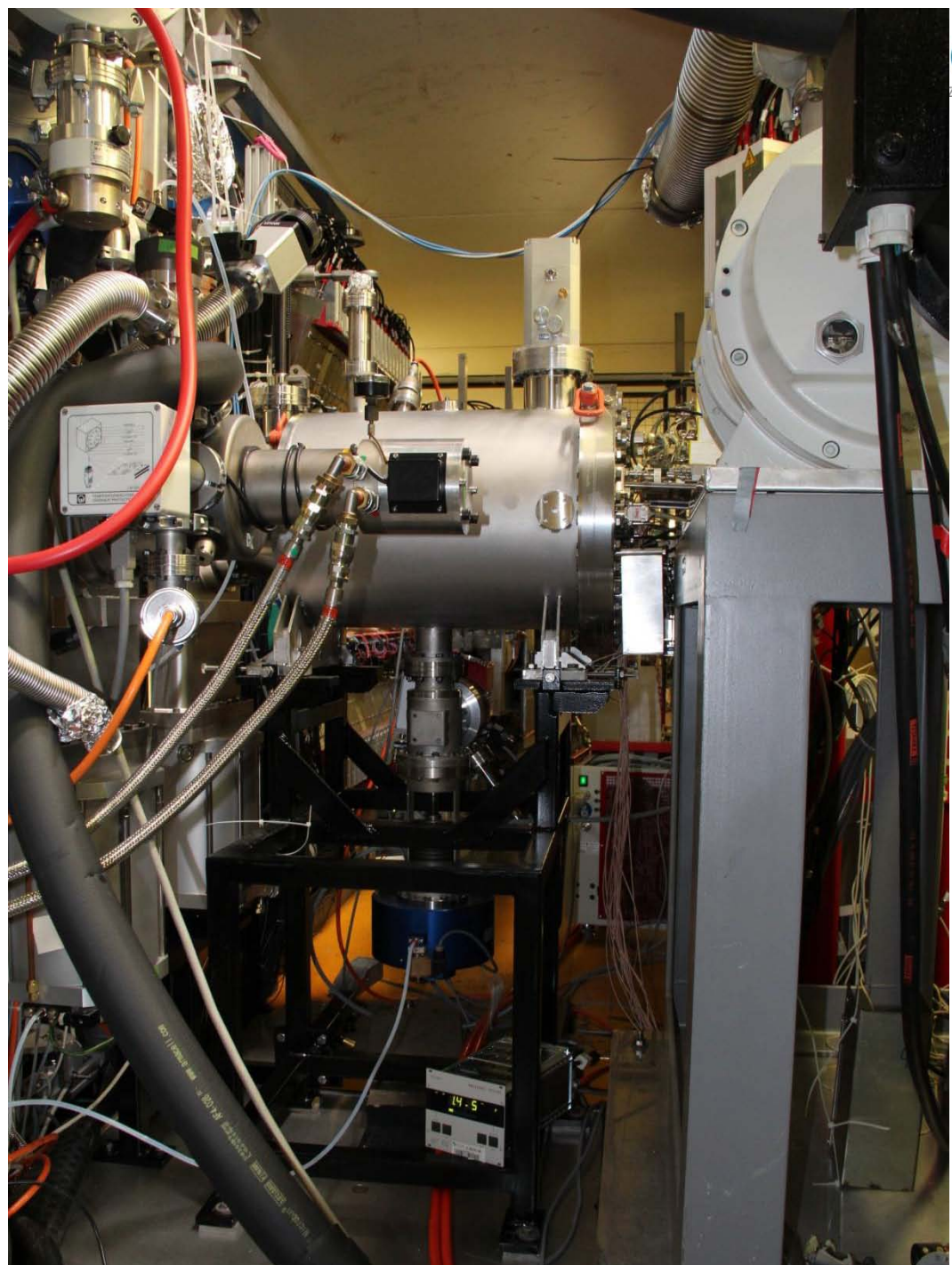




**Adaptor flange      Gate valve**



## Side view of chamber in tunnel

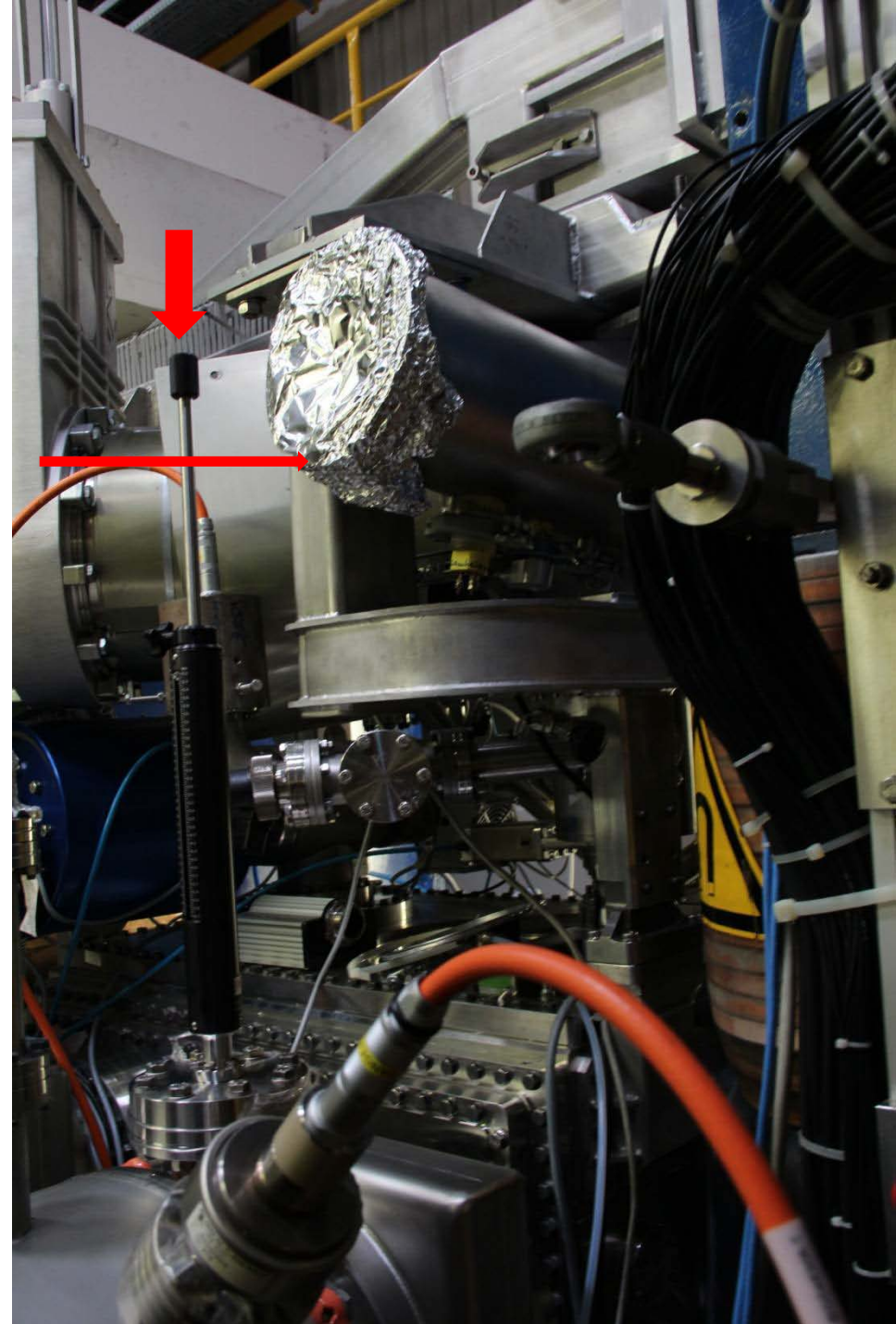




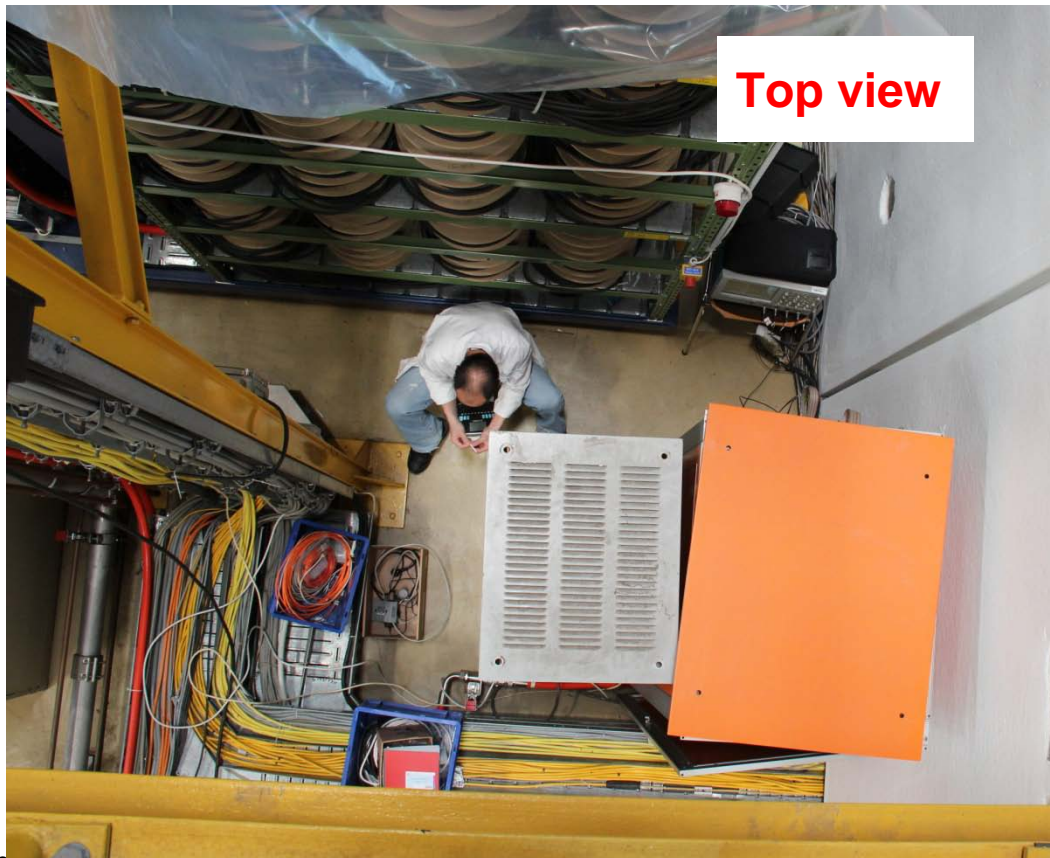
## Problem:

Source transmission conflicting with root pump bellow

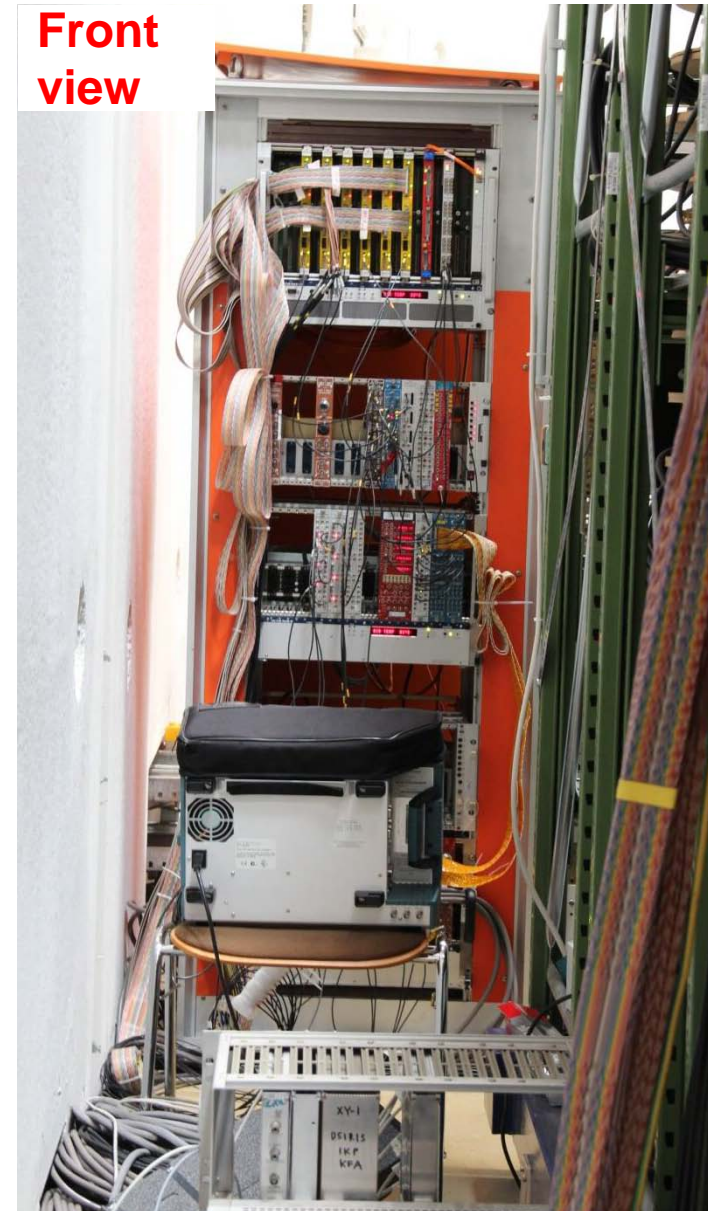
To be solved by adding one adaptor between pipe and root pump bellow (adaptor under construction)



Racks sit at the corner of ANKE electronics platform



Front view



## To do list

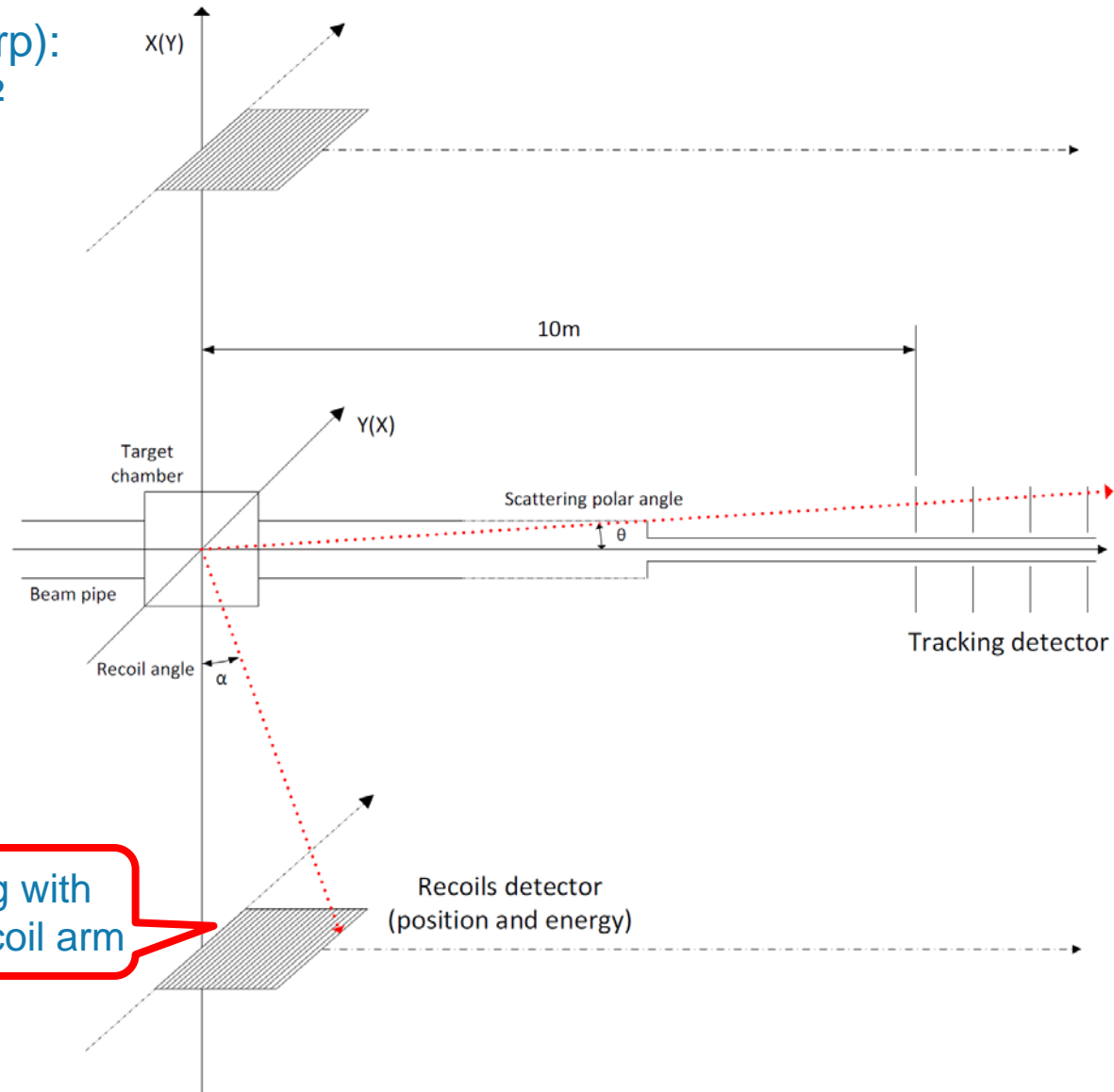
- **Full system ready**
  - new IP address for devices,
  - fine tuning electronics,
  - optimizing data taking code
  - ...
- **Calibration before beam test**
- **Beam time**
  - On Week 29 and Week 39



**Thanks for your attention!**

# Sketch of day-one experiment

Large t-range (pbarp):  
0.0008-0.1 GeV<sup>2</sup>



Starting with one recoil arm

# Performance evaluation with pure elastic events

## Setting for event generator(DPM):

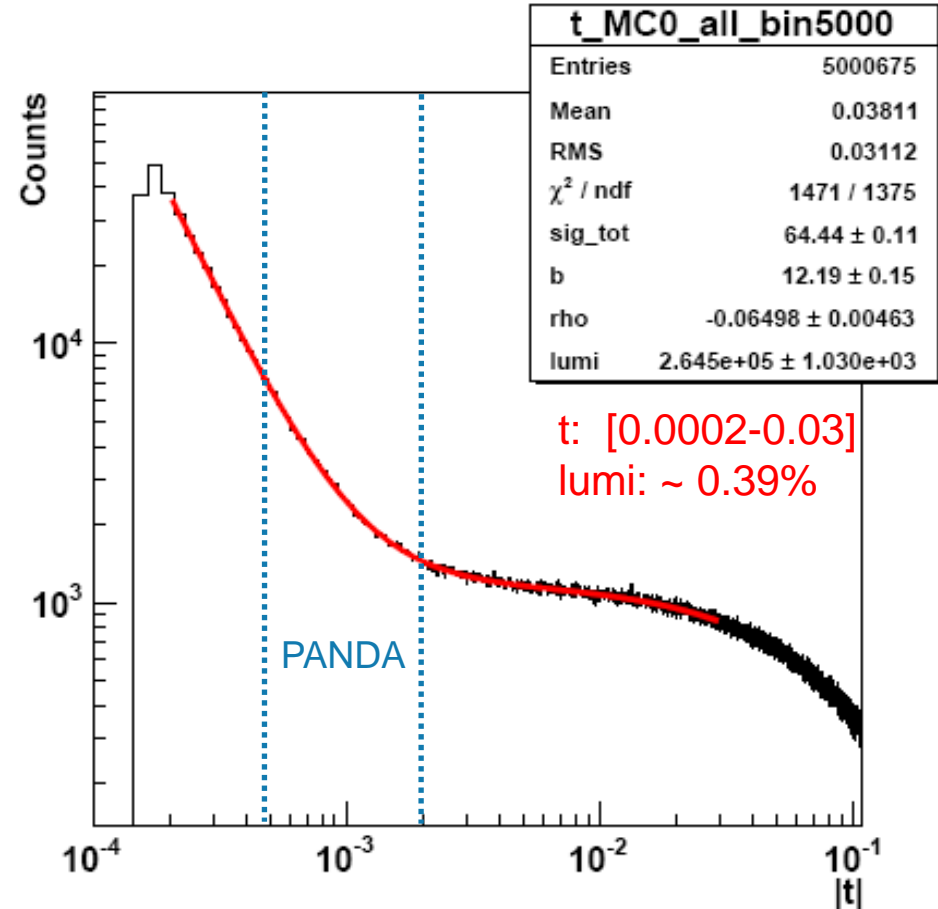
$P_{\text{lab}}$  : 6.2 GeV/c, pure elastic events  
 $\Theta_{\text{min}}$  : 0.113° (~1.98mrad)  
 Events : 5M  
 Parameters :  $\sigma_{\text{el}} = 18.97\text{mb}$ ,  $\sigma_{\text{tot}} = 64.50\text{mb}$ ,  
 $b = 11.89(\text{GeV}/c)^{-2}$ ,  $\rho = -0.063$

$$\frac{dN}{dt} = L \left( \frac{d\sigma_c}{dt} + \frac{d\sigma_{\text{int}}}{dt} + \frac{d\sigma_n}{dt} \right)$$

$$\frac{d\sigma_c}{dt} = \frac{4\pi\alpha^2 G^4(t)(hc)^2}{\beta^2 t^2}$$

$$\frac{d\sigma_n}{dt} = \frac{\sigma_T^2 (1 + \rho^2) e^{-b|t|}}{16\pi(hc)^2}$$

$$\frac{d\sigma_{\text{int}}}{dt} = \frac{\alpha\sigma_T G^2(t)(hc)^2}{\beta|t|} e^{-\frac{1}{2}b|t|} (\rho \cos\delta + \sin\delta)$$



**The measurable  $t$  is limited to a small range!**