

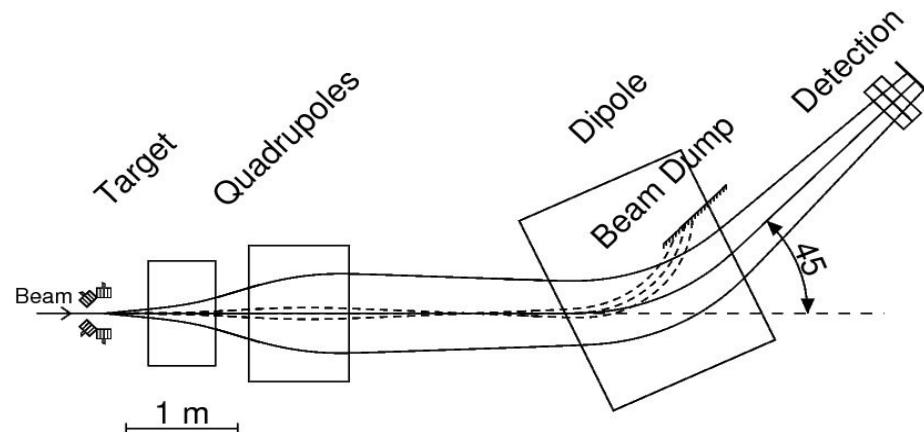
VAMOS in gas-filled mode and MUSETT

Ch.T for the VAMOS-GFS Collaboration
CEA IRFU SPhN/SIS/SEDI - GANIL

17th AGATA Week – October 3-7 2016

VAMOS-GFS in brief

- Upgrade of the VAMOS spectrometer as a gas-filled separator
- Proof of principle established in 2010 with a test experiment



C. Schmitt et al., NIM A 621 (2010) 558

Transmission :

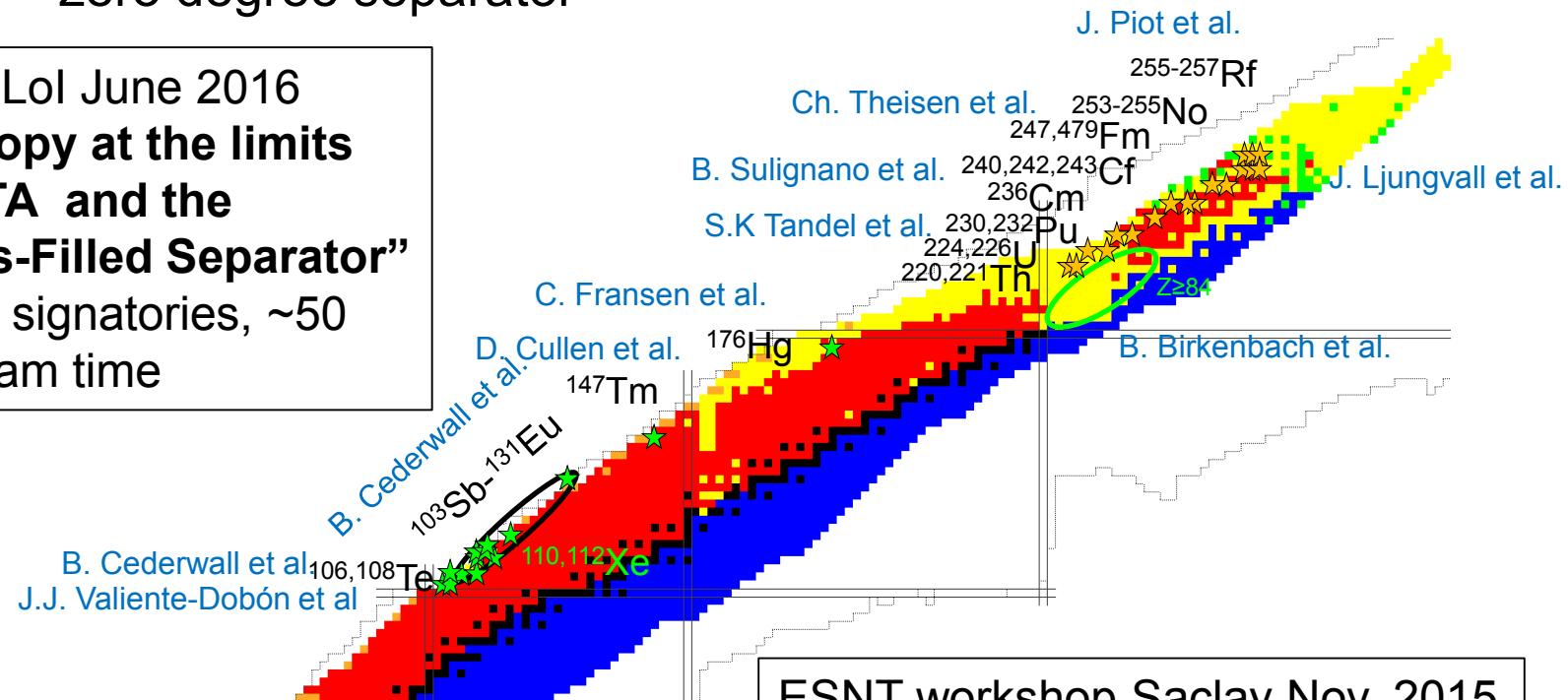
- 95 % for xn channels
- 80% for α , p channels

Rejection $> 10^{10}$

What for ?

- Fusion evaporation reactions
- Low cross-sections → separator + tagging techniques
- Regions of interest : VHE/SHE, ^{100}Sn region, proton drip-line, neutron-deficient Pb
- Note: no other place foreseen for the coupling of AGATA with a zero degree separator

PAC GANIL Lol June 2016
**“Spectroscopy at the limits
 using AGATA and the
 VAMOS Gas-Filled Separator”**
 31 labs, 180 signatories, ~50
 weeks of beam time



ESNT workshop Saclay Nov. 2015
<http://esnt.cea.fr/Phocea/Page/index.php?id=52>

The design

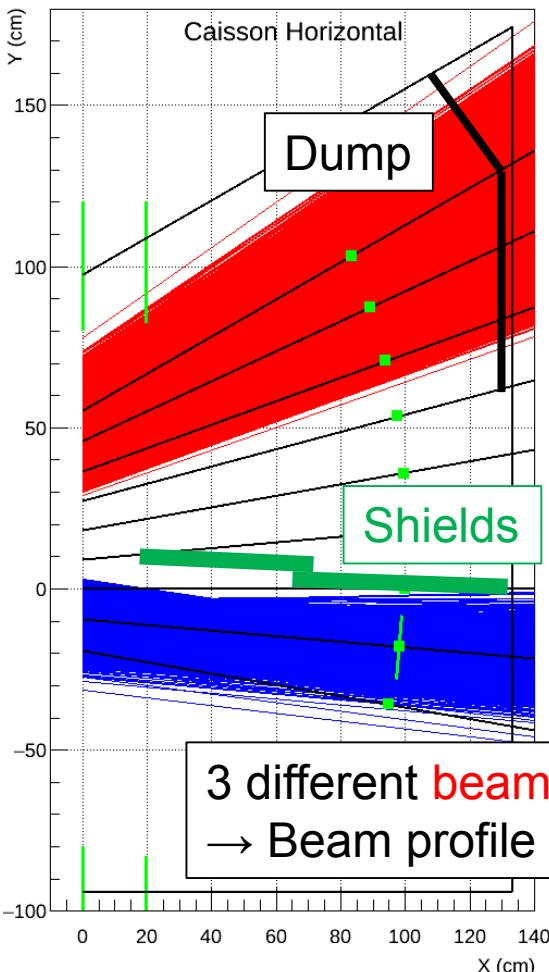
- Simulations
 - Beam optics
 - C Window position and size
 - Physics generator (fusion evaporation, scattered ions, straggling, energy losses, etc.)
 - Transport in the separator (Vacuum approximation + gas-filled)
 - Focal plane geometry
 - Beam dump
 - Detectors size and position
 - Shields and masks
 - VAMOS translation vs target position
 - (gas pressure)
- Mechanics design constrained by simulations + RITU expertise

Focal plane geometry optimized for different reactions

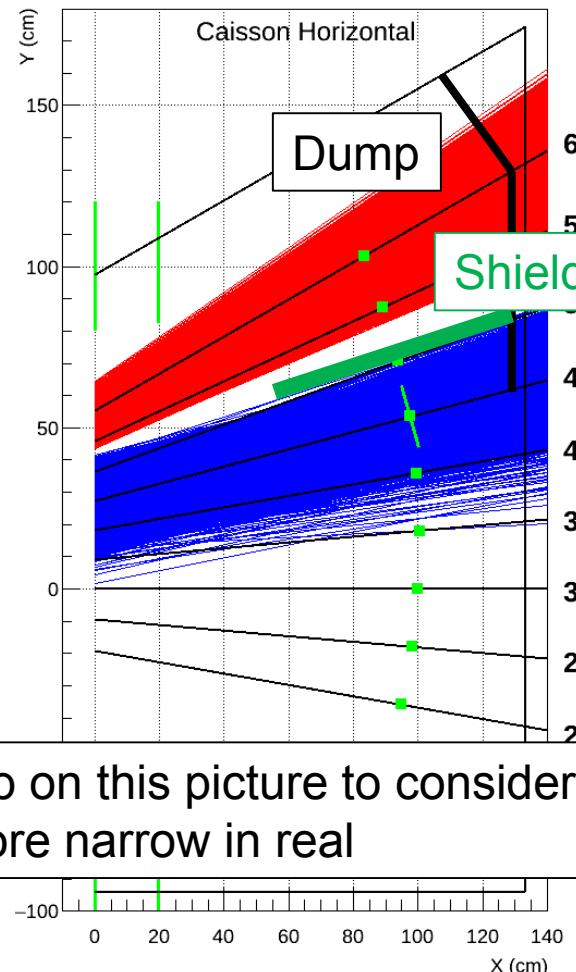
Agata

A
G
A
T
A

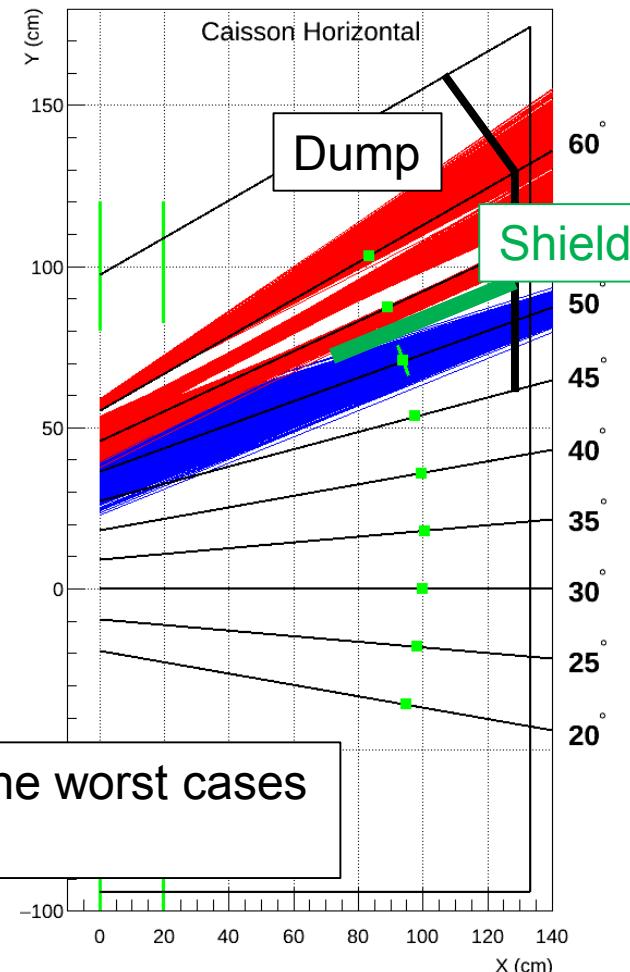
$^{48}\text{Ca} + ^{208}\text{Pb}$



$^{54}\text{Fe} + ^{58}\text{Ni} + \text{degrader}$



$^{208}\text{Pb} + ^{48}\text{Ca} + \text{degrader}$

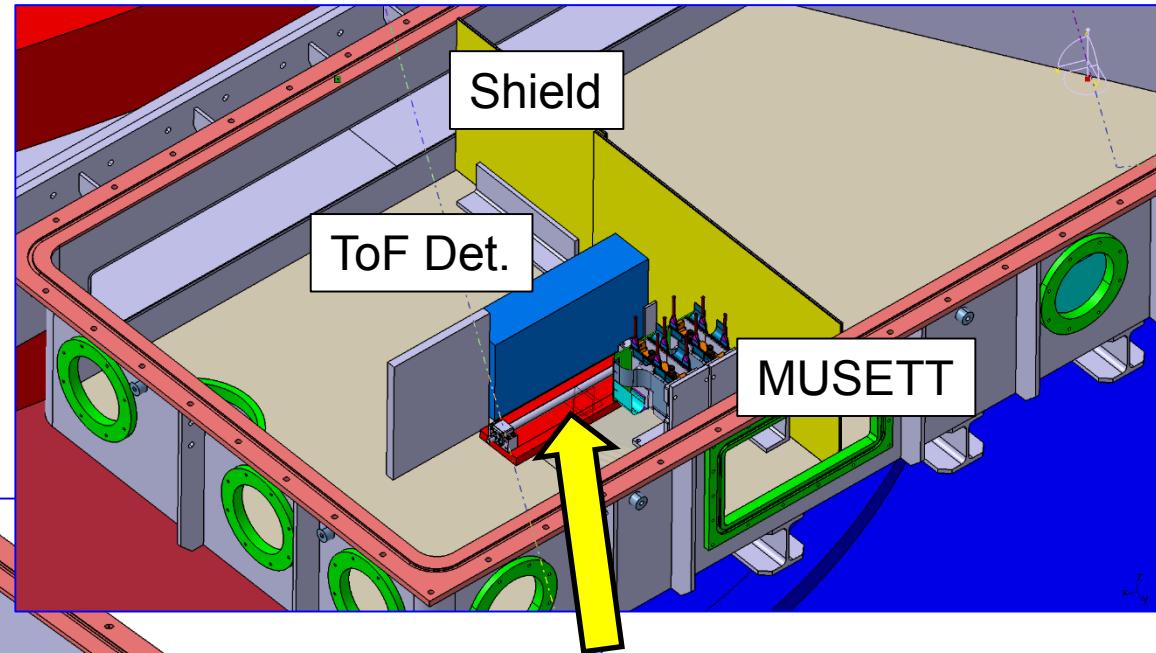
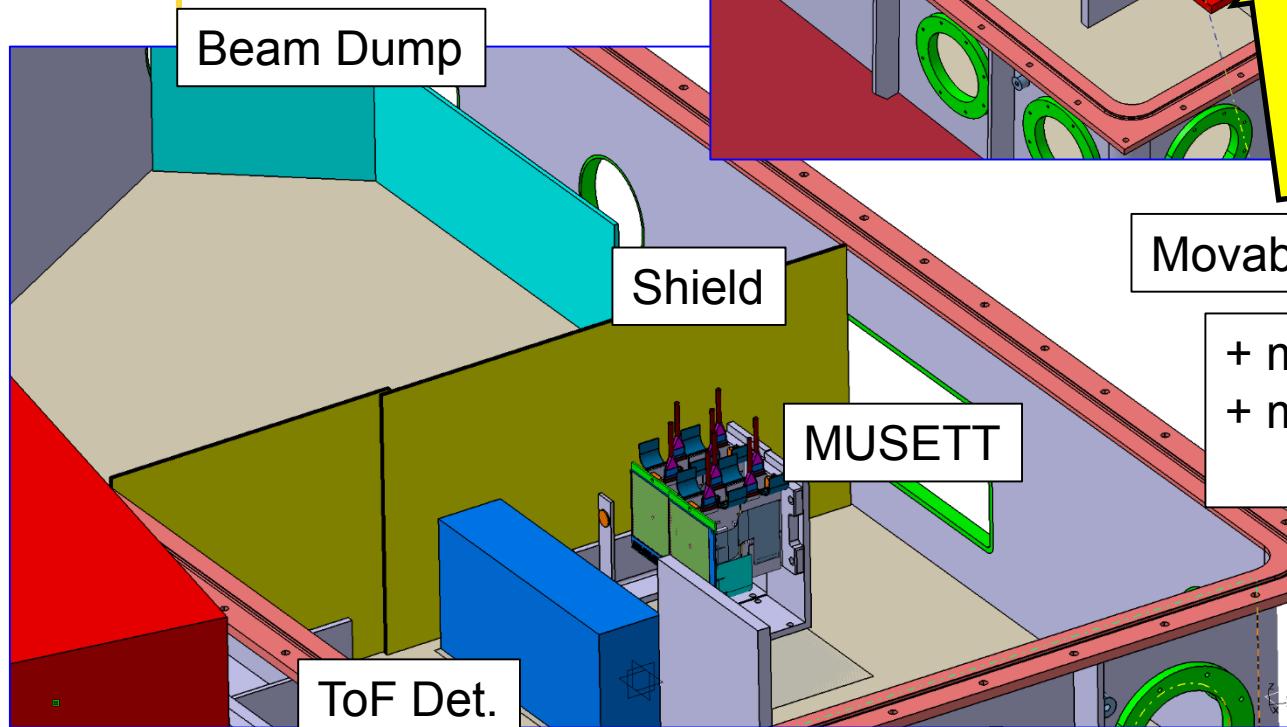


3 different beam Bp on this picture to consider the worst cases
→ Beam profile more narrow in real

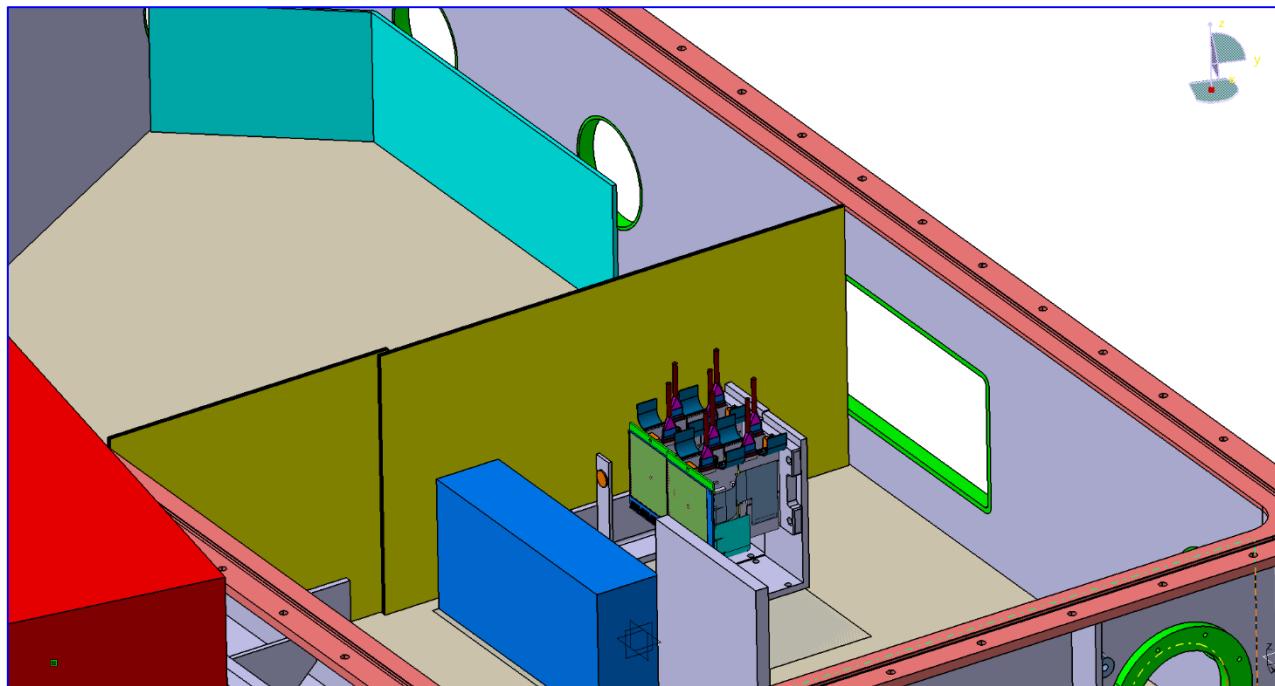
Det. 25°, 20x10 cm²

Det. 45°, 20x10 cm²

Det. 50°, 10x10 cm²

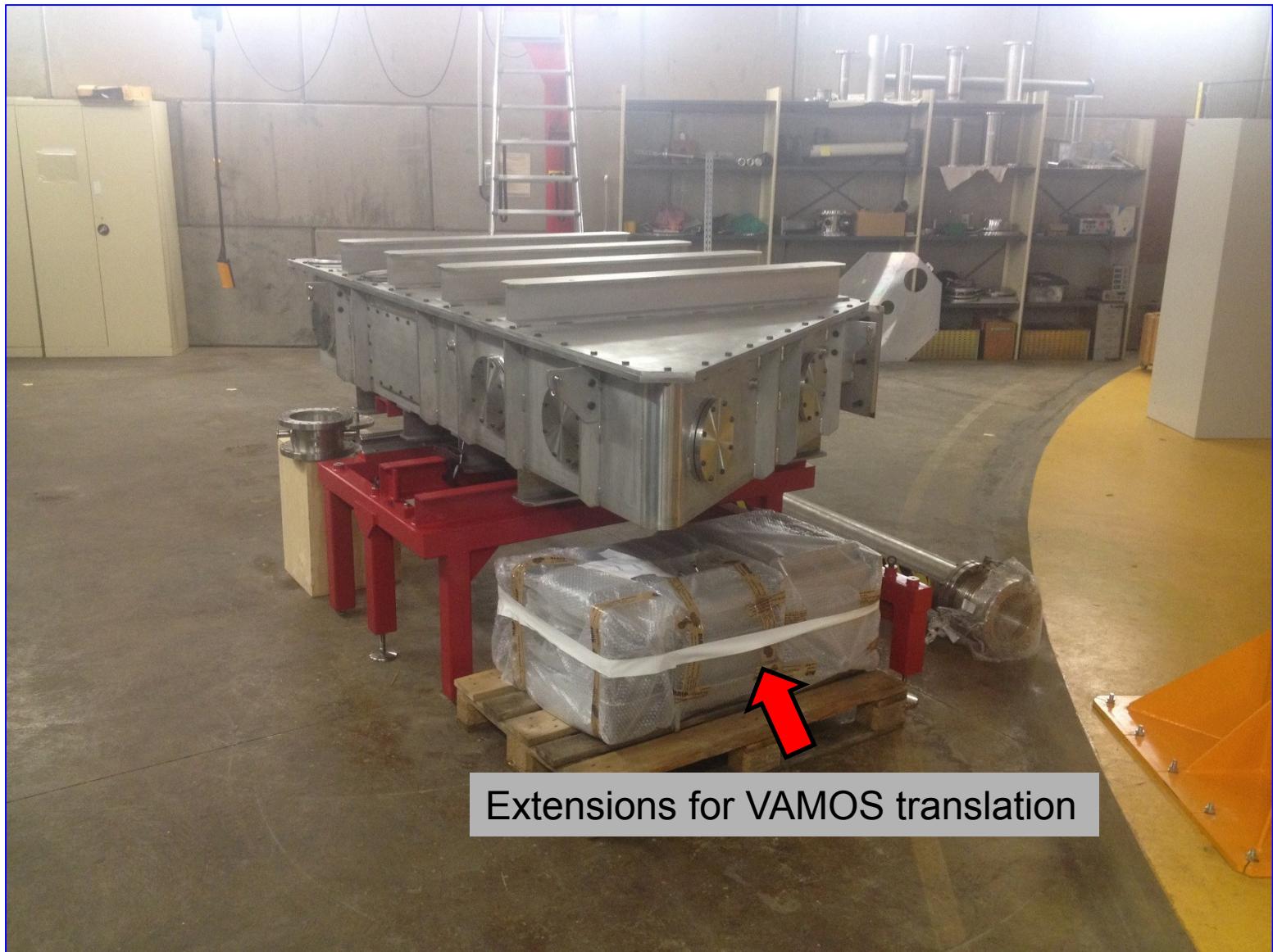


Status : focal plane detectors and equipment

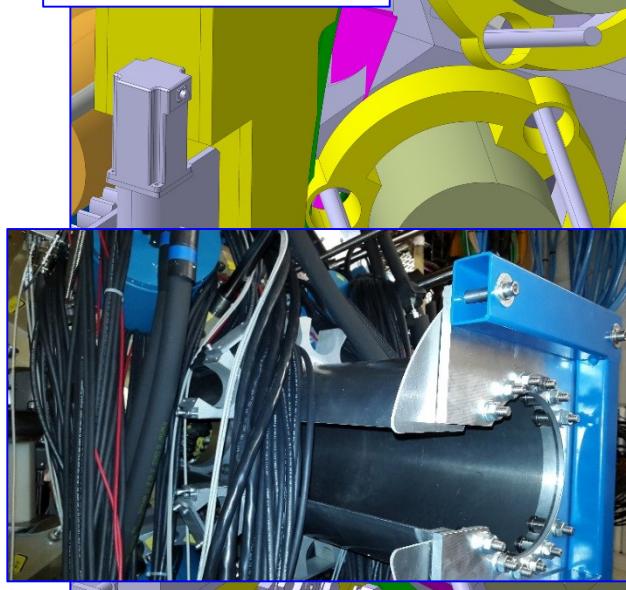
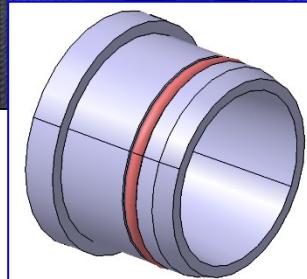
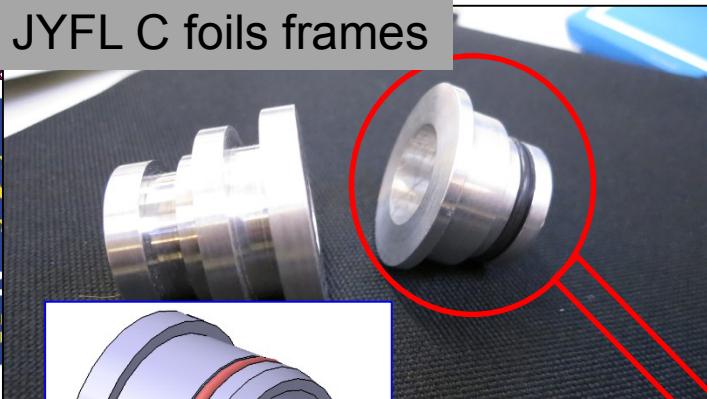


- New MUSSETT mechanics → ready soon
- 2 new detectors (micron semiconductor) delivered July 2016
- Beam dump and shields → ready soon
- Movable source + masks → partly existing
- New ToF → based on existing MWPC, in progress
- Installation + tests foreseen Q1-2 2017

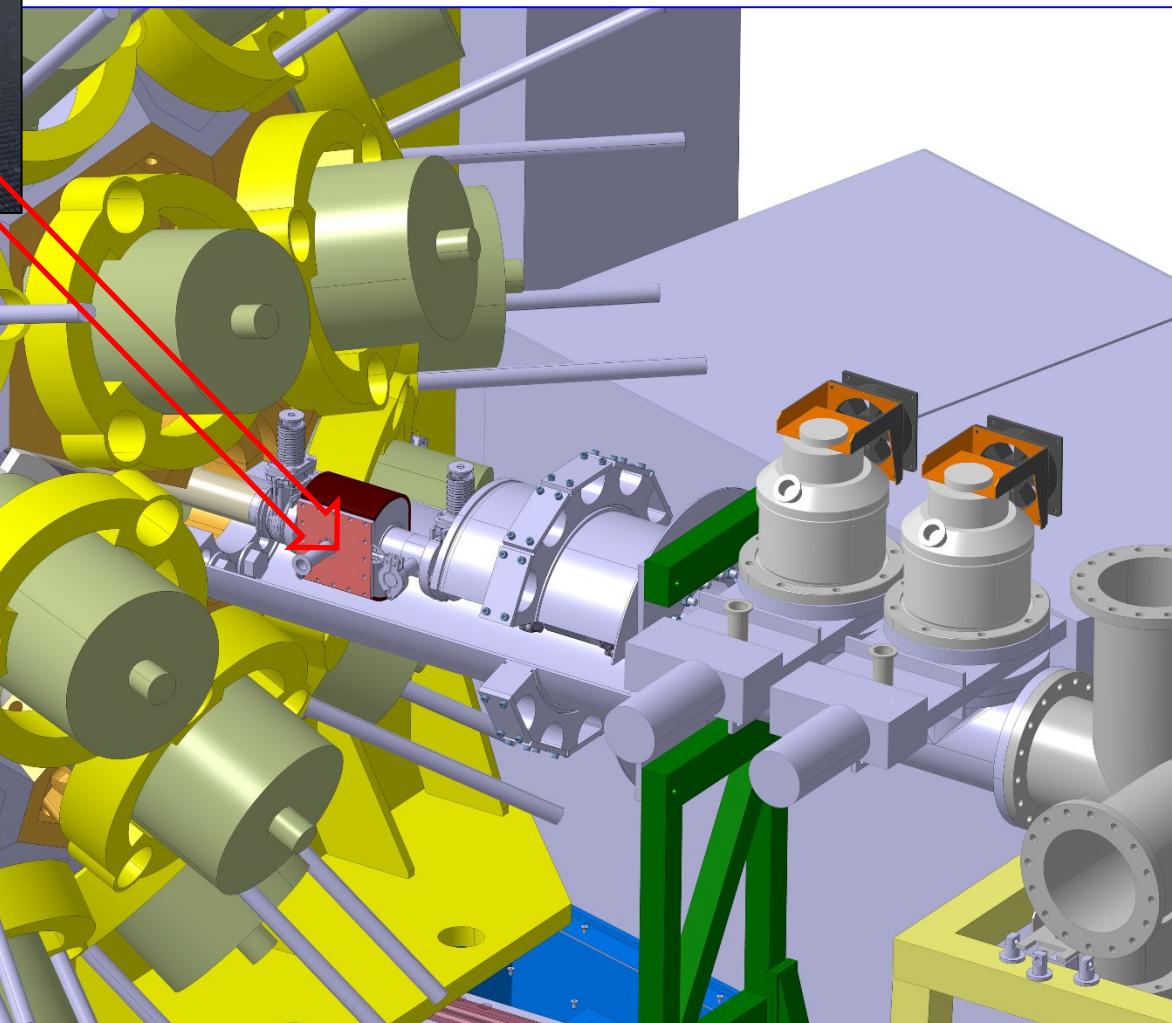
Status : focal plane caisson

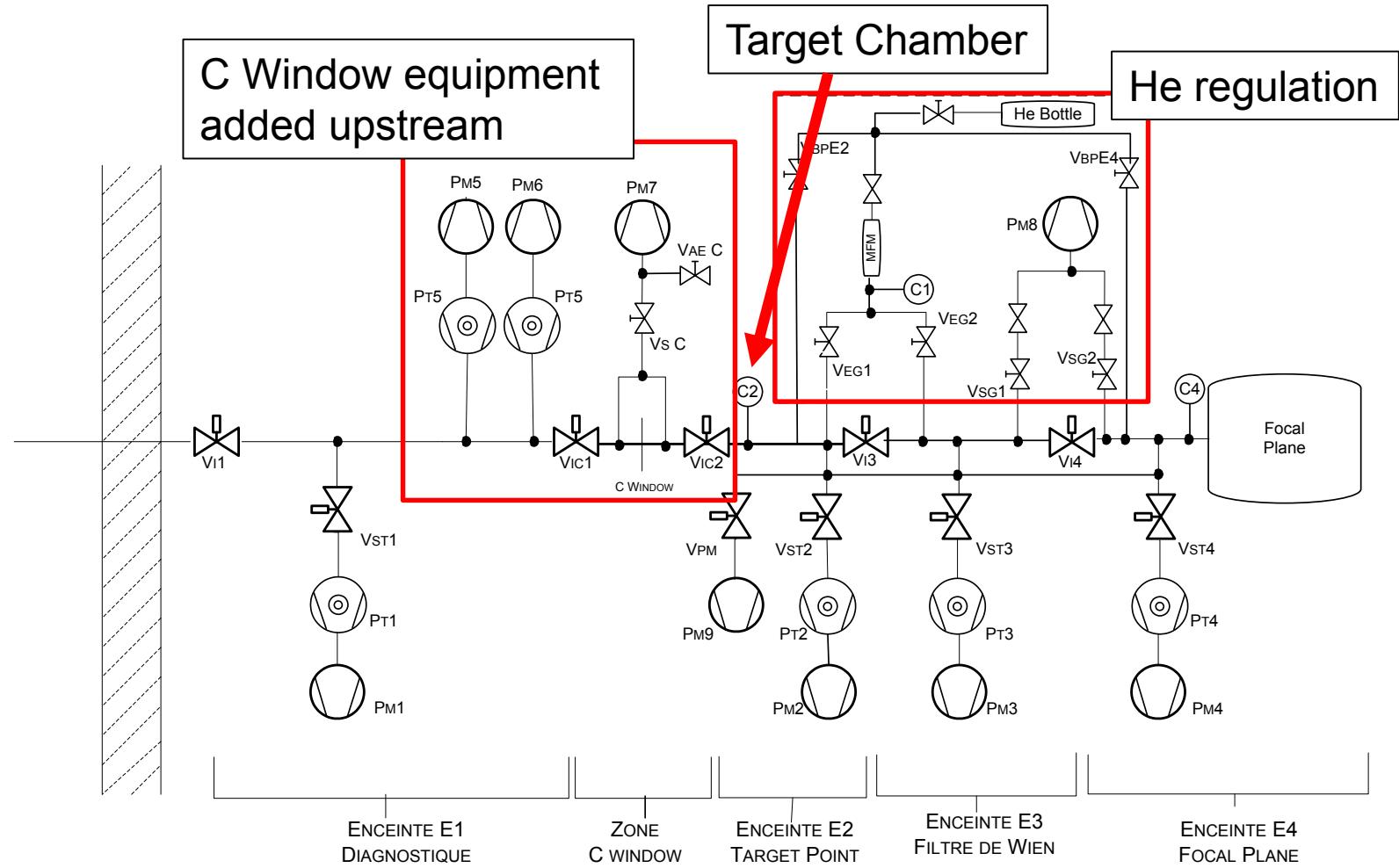


JYFL C foils frames



Inspired from 2009 test & RITU@JYFL
→ call for tender





- C&C : minor updates needed
- VXI MUFI electronics + DAQ at Saclay since Jan. 2016
- Cables + MUSSETT feedthroughs (a lot) OK
- ToF detector = same electronics as VAMOS++
 - coupling with AGAVA
 - no problems foreseen but need to check

Summary

- Large physics case, LoI PAC 2016
- Caisson + frame ready
- Extensions ready
- Dump, shields, MUSSETT mechanics : design almost finished
- C Window : call for tender
- Electronics + DAQ : no problem foreseen but tests needed

VAMOS-GFS Team

MECHANICS: P. Girardot, A. Raut, Ph. Daniel-Thomas, P. Gangnant, P. Contrepois, P. Graffin et al.

MUSSETT : E. Monmarthe, B. Sulignano et al.

MUSSETT EDAQ : C. Houarner, L. Legeard, C. Maugeais, F. Saillant et al.

GAS Detector : G. Frémont et al.

VAMOS : J. Goupil, A. Lemasson et al.

AGATA : E. Clément, L. Menager, J. Ropert, et al.

SIMULATIONS & OPTICS : Ch.T, J. Saren (JYFL), B. Jacquot, Ch. Schmitt

PLC : J. Cacitti

+ JYFL RITU team for help and advices