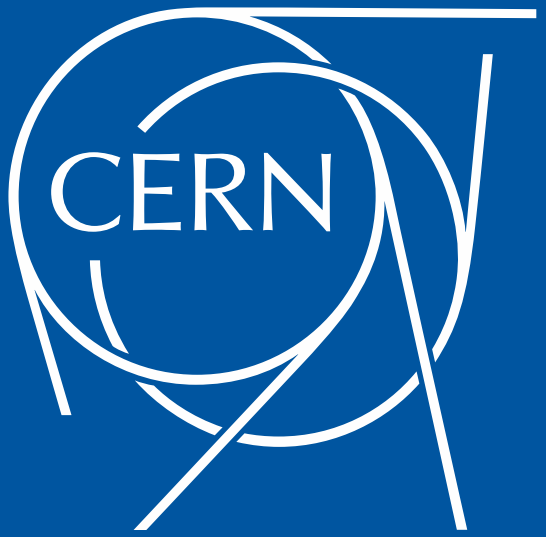

CERN

Pres. by A. Dorsival

WP Vacuum Target areas and class A labs

Main goals of the WP

Improve the RP safety of the Isolde vacuum system in view of a power increase on the source.

Study of dry pumps + filter of radioactive contaminants by absorbers

Improve the knowledge of the propagation of radioactive contaminants along the beam line

Experimental and numerical study of propagation of radioactive neutrals

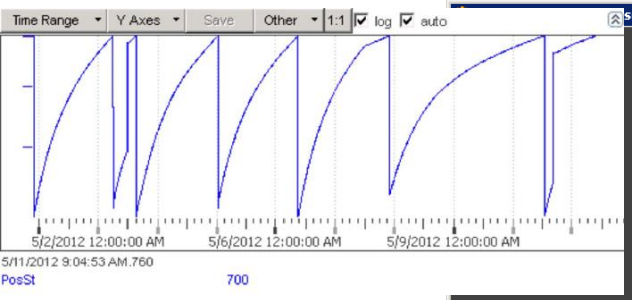
Accompany beam quality improvement by Monte-Carlo simulation of vacuum on the new Radio Frequency Quadrupole Cooler and Buncher.

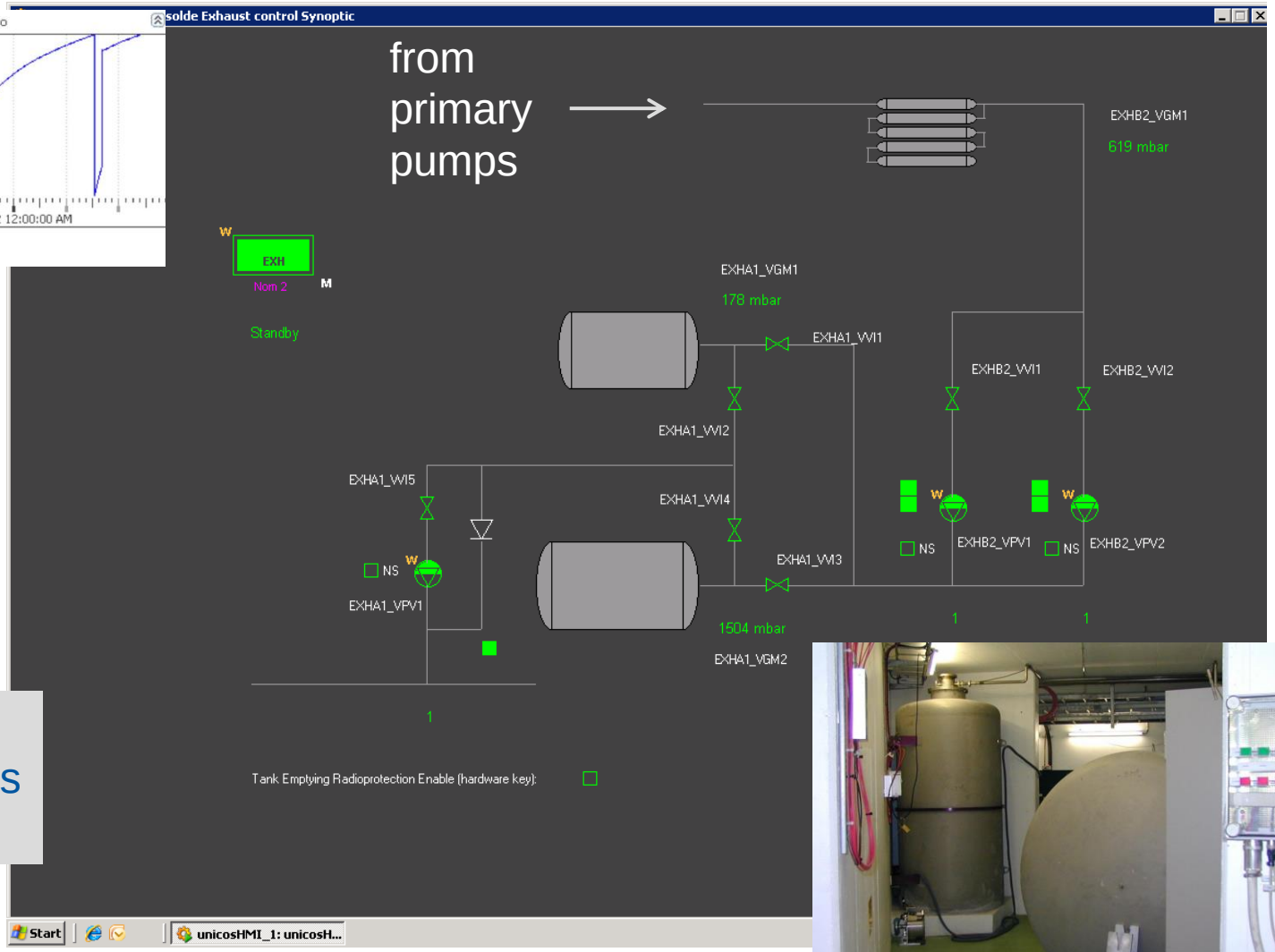
Simulation and benchmarking of pressure profile accompanying the design modification on ISCOOL

Establish a collaboration with SPES and Spiral2 on gas recuperation schemes and procedures for the vacuum system.

Participation to reviews in each institute by colleagues from the other 2 partners

Gas recuperation system at Isolde

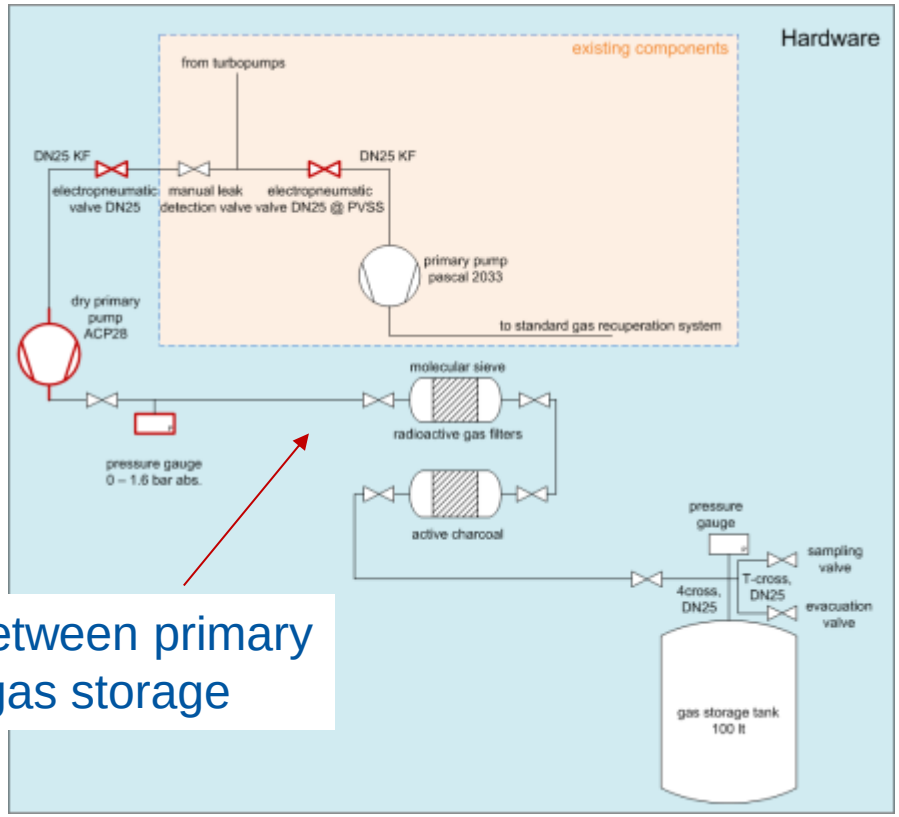




- fill
- decay 3 months
- empty

Dry-pump stand and test

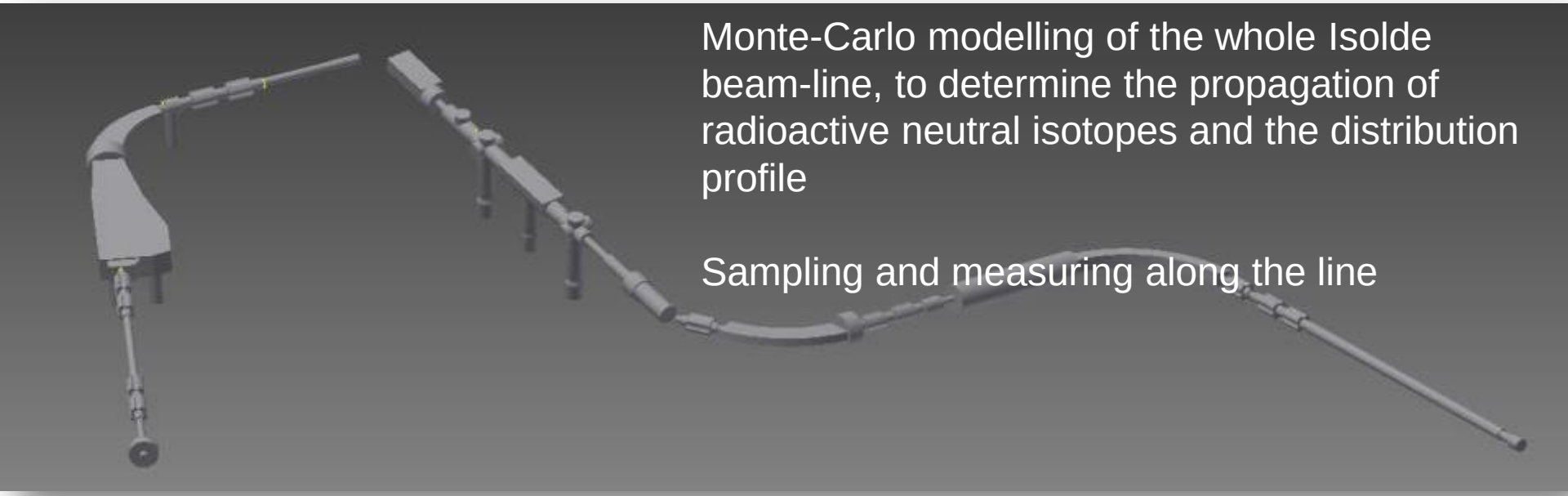
Substitution of normal, oil sealed pumps with dry pumps and pre-filtering before storage



Selective filtering between primary pump and dummy gas storage

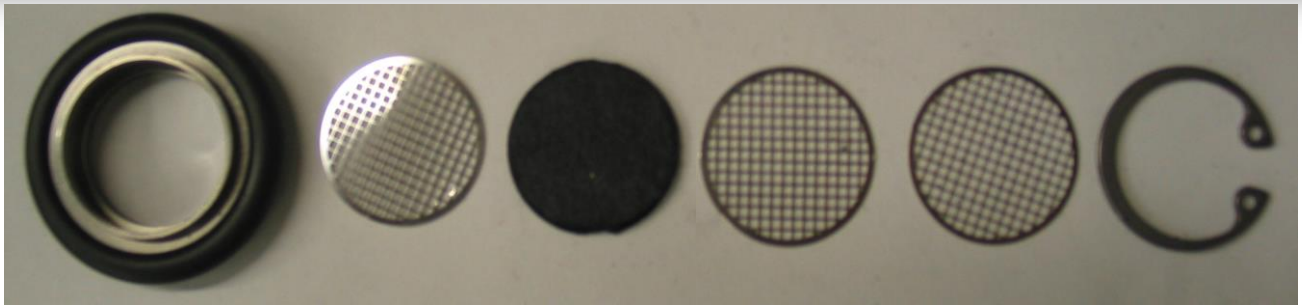
Spectroscopy on filters in in work

Study of propagation of radioactive contamination



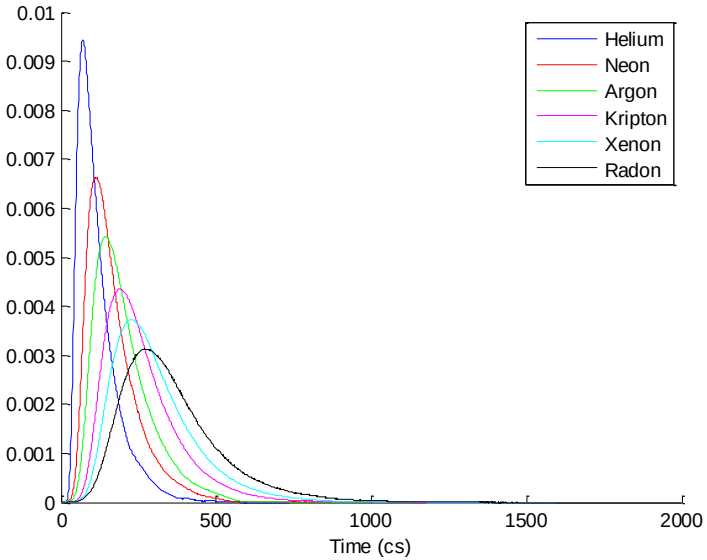
Monte-Carlo modelling of the whole Isolde beam-line, to determine the propagation of radioactive neutral isotopes and the distribution profile

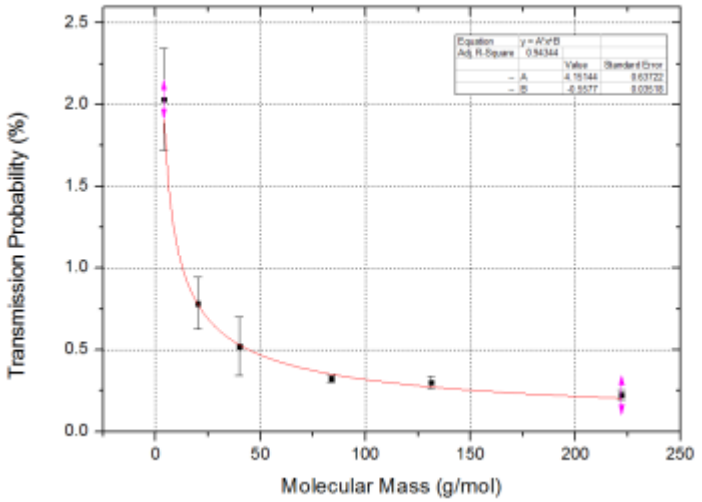
Sampling and measuring along the line



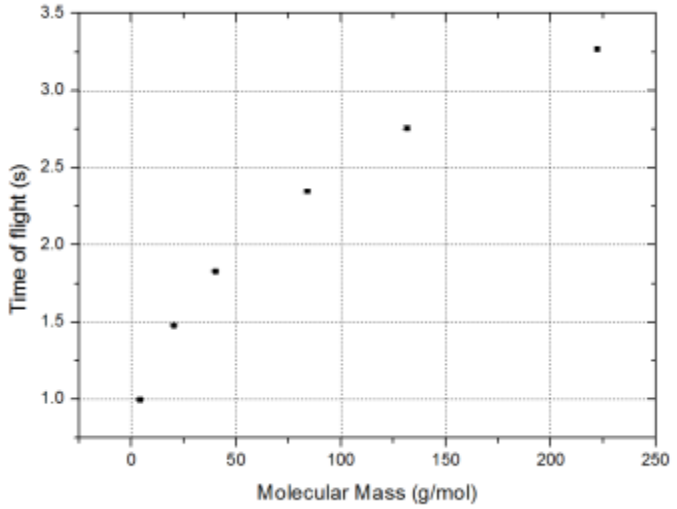
Sampling via carbon filters as done in TRIUMF

Monte-Carlo simulation on propagation of radioactive species





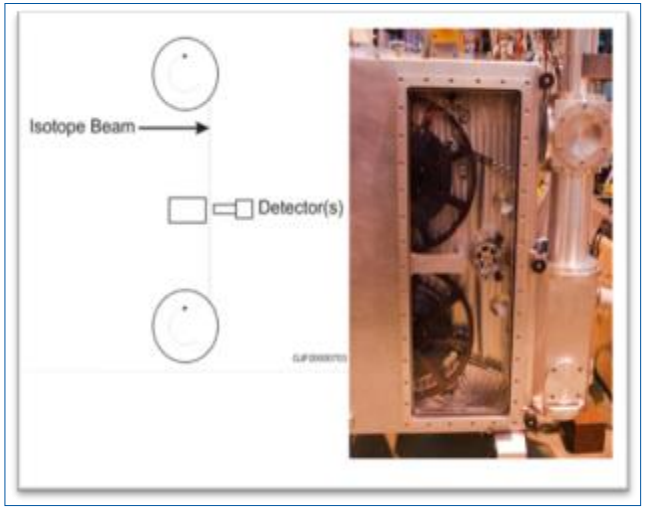
Transmission probability and time of flight depend on mass and on lifetime of the isotope



Sampling and measurement of radioactive species

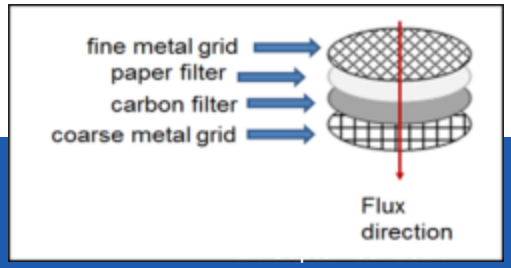
Use of a tape station to

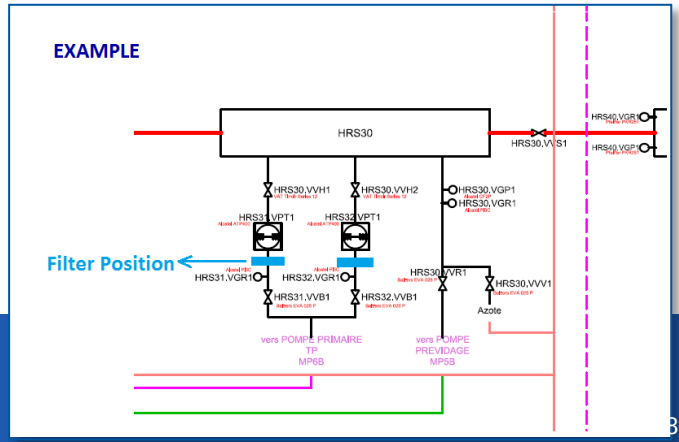
- analyze ACTIVITY and evaluate the TIME OF FLIGHT of different gas species (spectroscopy);
- TEST the accuracy of Monte Carlo model (time dependent mode).



On-line Sampling :

- Realized along the primary pumping system, with active carbon and cellulose filters installed downstream of the turbomolecular pumps;
- Spectroscopy Analysis.



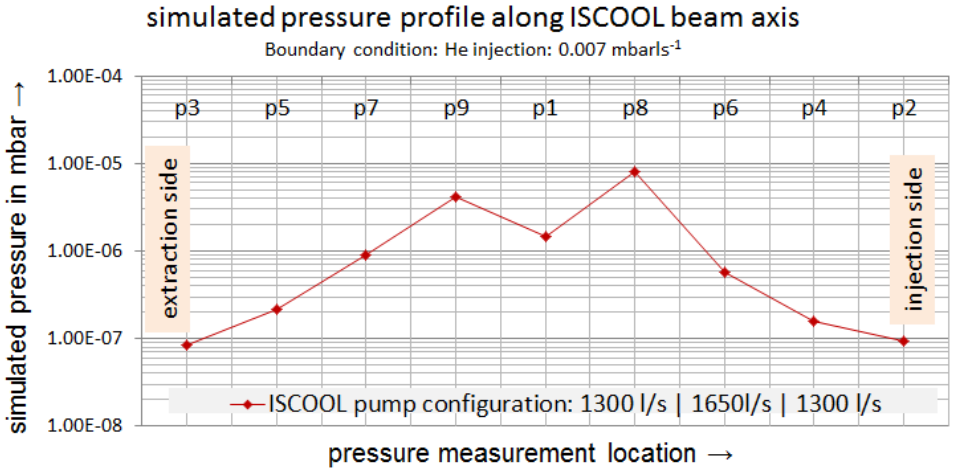


Vacuum study on the RFQCB

Monte-Carlo modelling:

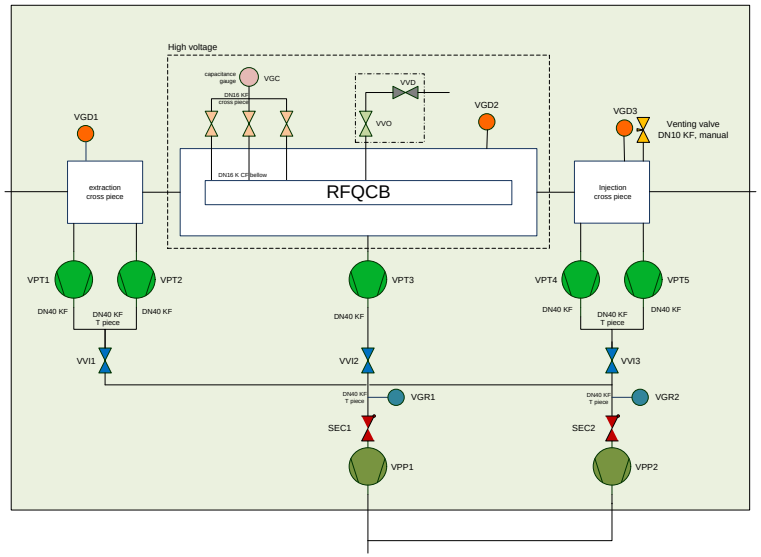
Benchmarking with ISCOOL
Model for the new RFQCB

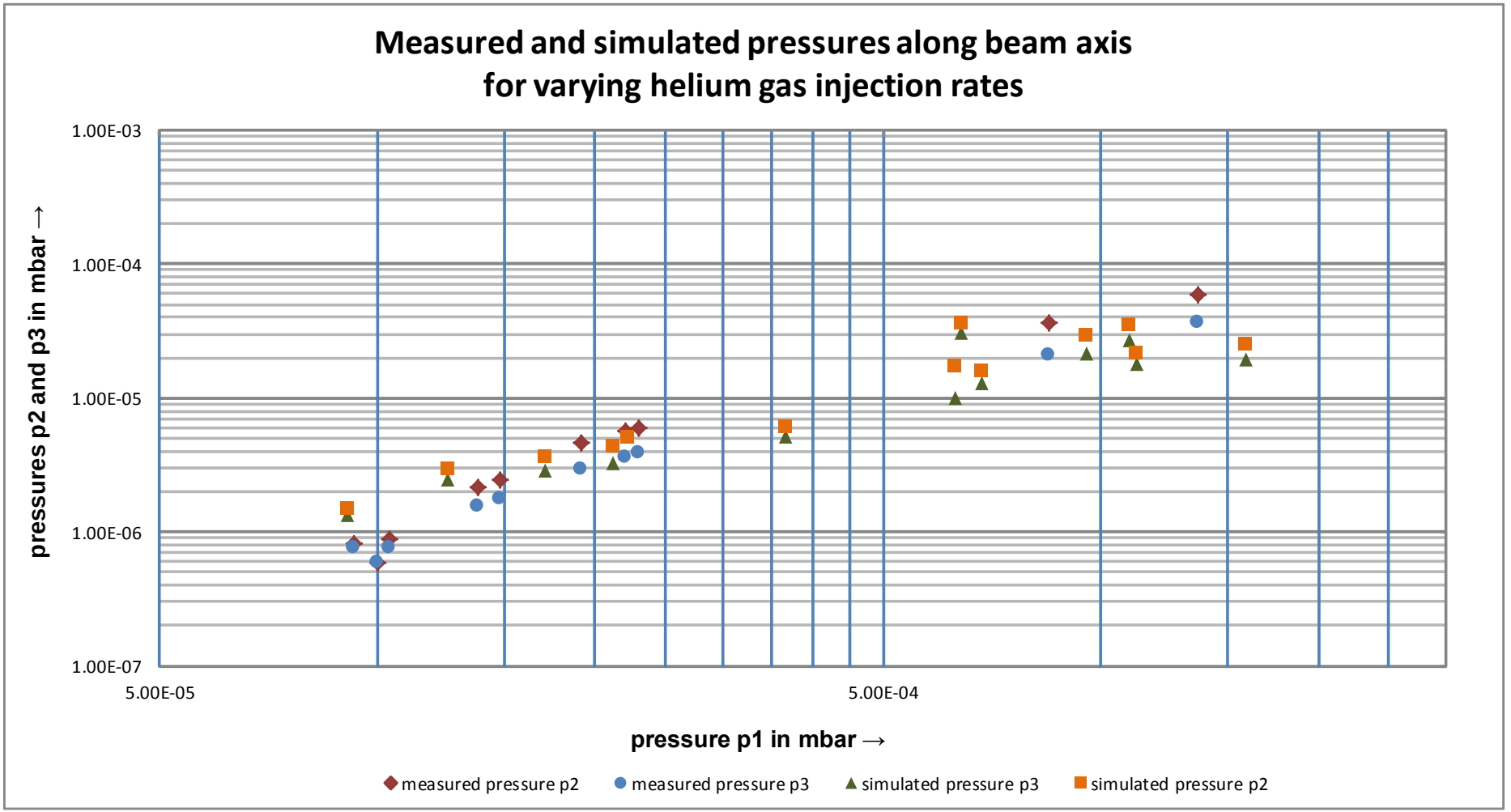
Orifice flow modelling for
“source term” in the MC model



New RFQCB test stand:

Use of magnetic bearing turbo-pumps for maximization of pumping speed
Doubling the extremity pumps




Measured and simulated pressures along beam axis
for varying helium gas injection rates
pressures p2 and p3 in mbar →
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
5.00E-05
5.00E-04
pressure p1 in mbar →
measured pressure p2
measured pressure p3
simulated pressure p3
simulated pressure p2

Collaboration Isolde-Spiral2 -SPES

Participation of CERN experts and SPES colleagues to safety reviews on Gas Recuperation:

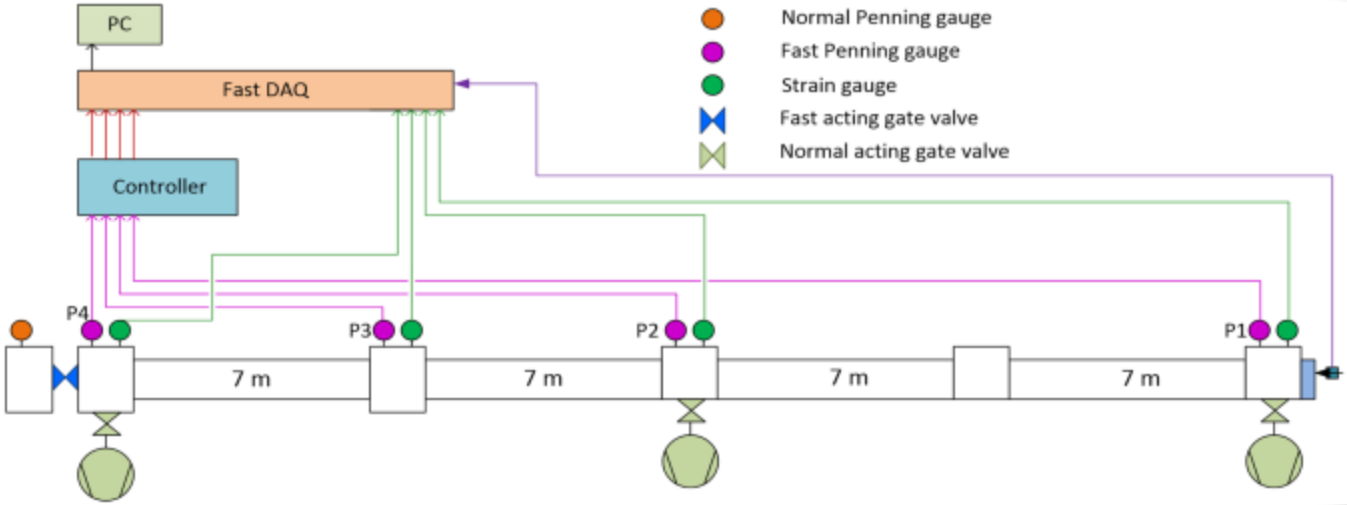
- Gas recuperation system of Spiral2, 29/5/2013
- Gas recuperation system of INFN-Catania Labs, 16/5/2013

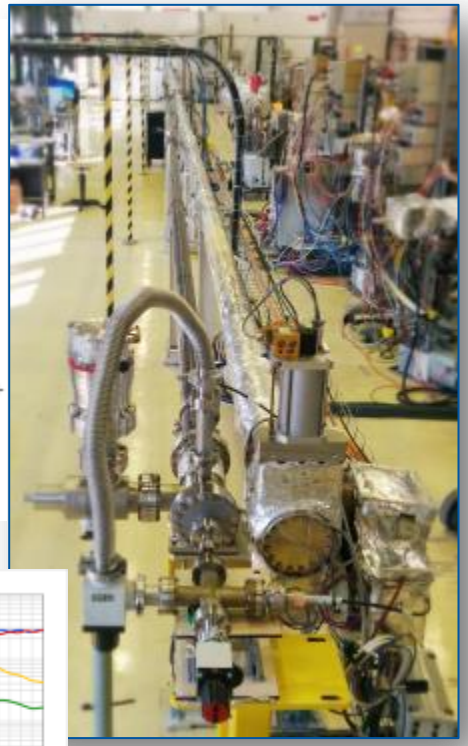
Participation to safety review and collaboration of fast valves:

- Fast valves for Spiral2 review, January 2013
- Joint set-up on leak propagation and fast detection

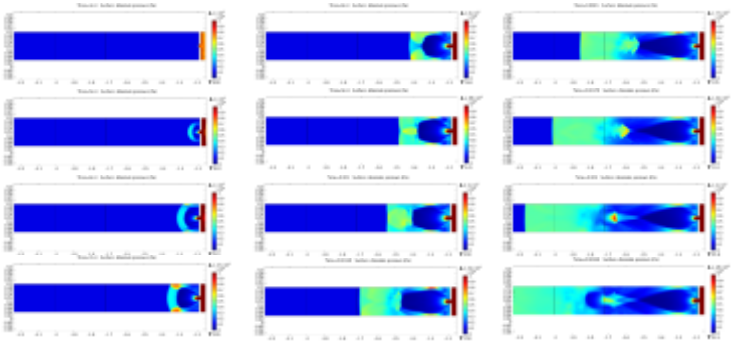
Collaboration HIE-Isolde and Spiral2 on fast valves

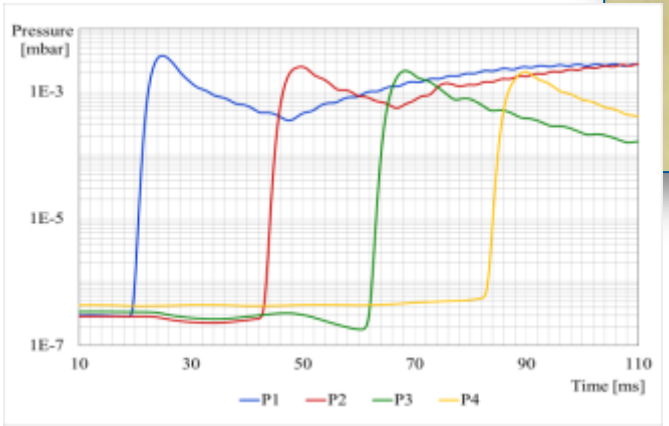
Test bench for leak propagation





FE simulation of pressure front propagation





Progression of the pressure front

Conclusions

We tried to fully exploit the Training and Networking potential of the project

Advancement in understanding of Vacuum issues for HIE-Isolde relied heavily on the Monte-Carlo Molflow code, developed and maintained at CERN

Collaboration was triggered by CATHI and will be pursued by other means, on the impulse created here.

We acknowledge collaboration, discussion and exchanges with all contributing colleagues:

GANIL: R.Levallois, P.Dolegieviez, M.Faye, A.Savalle….
SPES: A.M.Porcellato, C.Roncolato,…
INFN-Catania: S.Marletta,…
CERN: Y.Kadi, M.Hermann, W.Maan, M.Ady, R.Kersevan, M.Maietta, C.Babcock, M.Augustin, J.Montano, T.Stora, T.Giles, A.Gottberg, A.Dorsival, J.Vollaire
……and many others…..

Spare slides

Isolde vacuum layout