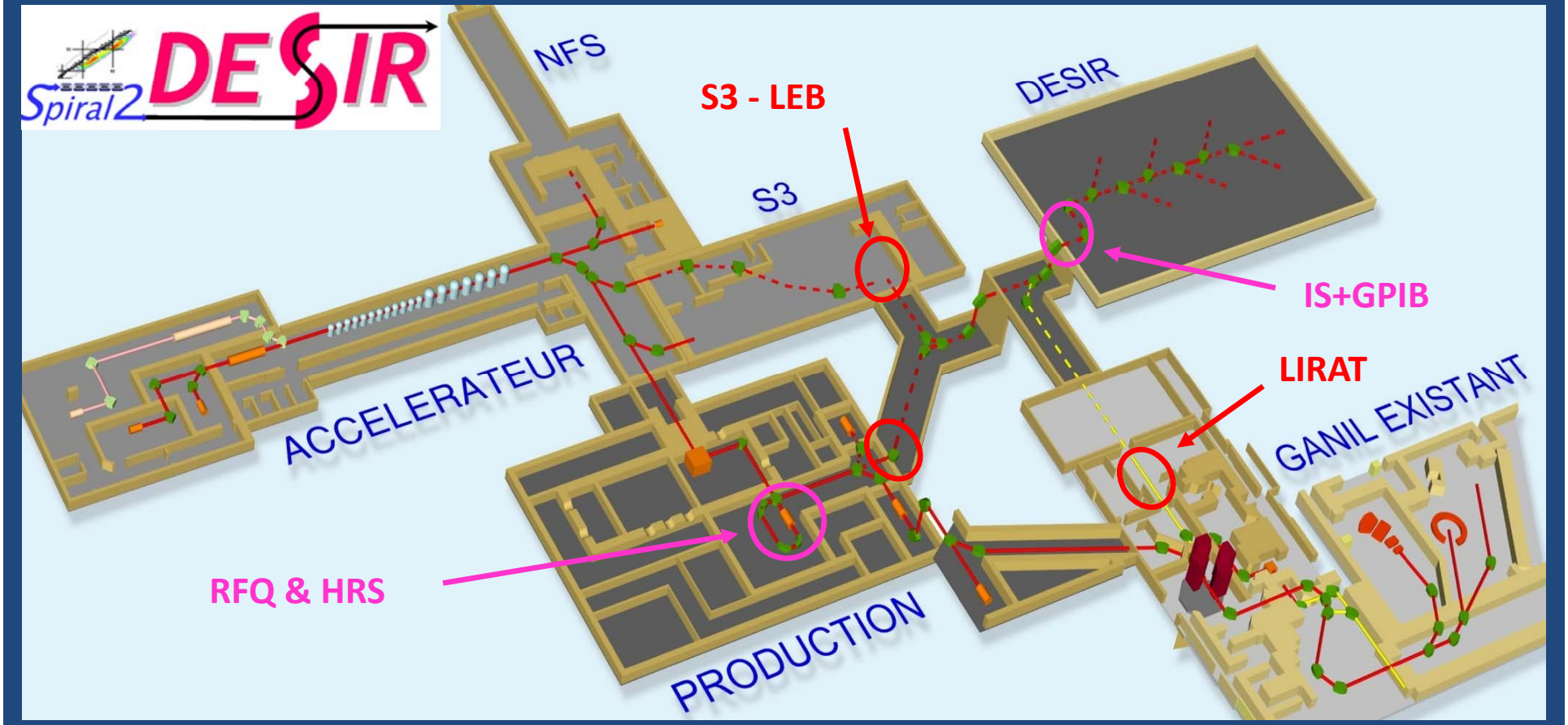
DESIR
Report on recent achievements

J.-C. Thomas, for the DESIR collaboration



http://www.cenbg.in2p3.fr/desir

DESIR News

- DESIR-EQUIPEX funding: constrains and solutions
- DEsir Collaboration Agreement (DECA)
- Beam preparation: SHIRaC + HRS
- Beam lines: undergoing design study work

- Layout of the experimental equipment
- News about:
  - LUMIERE
  - DETRAP:
    - PIPERADE
    - MLLTrap
    - LPCTrap

DESIR-EQUIPEX costs

	Equip. Construction (k€)		Equip. Operation (k€)	
	Phase 1	14102	Phase 2	1093
Coordination		83		97
Buildings		7416		564
Beam lines		5477		234
Ident. Sta.		219		9
GPIB		487		19
User supply		420		170

- DESIR-EQUIPEX funding: 9 M€ <-> 6.2 M€ missing

  - Investment cost reductions?

  - Co-financing , partnerships?

DESIR-EQUIPEX cost reductions

- Shorter operation time within the EQUIPEX program (36 months): ~550 k€
- Use of the PIPERADE RFQ and ion sources to replace the GPIB: ~550 k€
- Phasing of the beam-line construction: ~from 1600 k€ to 2400 k€
  - Inside DESIR: ~30 m, 1200 k€
  - Option 1: From S2 to DESIR: ~70 m, 2700 k€
  - Option 2: From S3 to DESIR: ~43m, 1700 k€
  - Option 3: From S1 to DESIR: ~50 m, 1900 k€
- Surface reduction of the DESIR hall and basement: ?

Total: from 1 M€ to 3.4 M€ or more

DESIR-EQUIPEX co-financing

- SPIRAL2-BARC collaboration for the construction of the mechanics of the beam lines: ~800 k€ to be discussed
- European financing program?
- Help from IN2P3 and GANIL?
- Help from Région Basse-Normandie and other local authorities?

- The priority is to secure the construction of the building -> ANR recommendation????

DESIR Collaboration Agreement (DECA)

Parties: 14 owners of DESIR experimental equipments

Commitment: ~5 M€, ~520 men.month

- GANIL/SPIRAL2, CEA-DSM/CNRS-IN2P3
- CEN Bordeaux-Gradignan, CNRS-IN2P3/Université de Bordeaux 1
- LPC Caen, CNRS-IN2P3/Université de Basse-Normandie, ENSICAEN
- CSNSM Orsay, CNRS-IN2P3/Université Paris 11
- IPN Orsay, CNRS-IN2P3/Université Paris 11
- IPHC Strasbourg, CNRS-IN2P3/Université Louis Pasteur
- LMU München
- K.U. Leuven
- University of Manchester
- FLNR JINR Dubna
- CSIC Valencia
- CSIC Madrid
- CIEMAT Madrid
- UPC Barcelona

NB: Ceremony of signature
Today, 12 AM

DECA Management Structure

Steering Committee:
All parties
1 vote / member
Political body

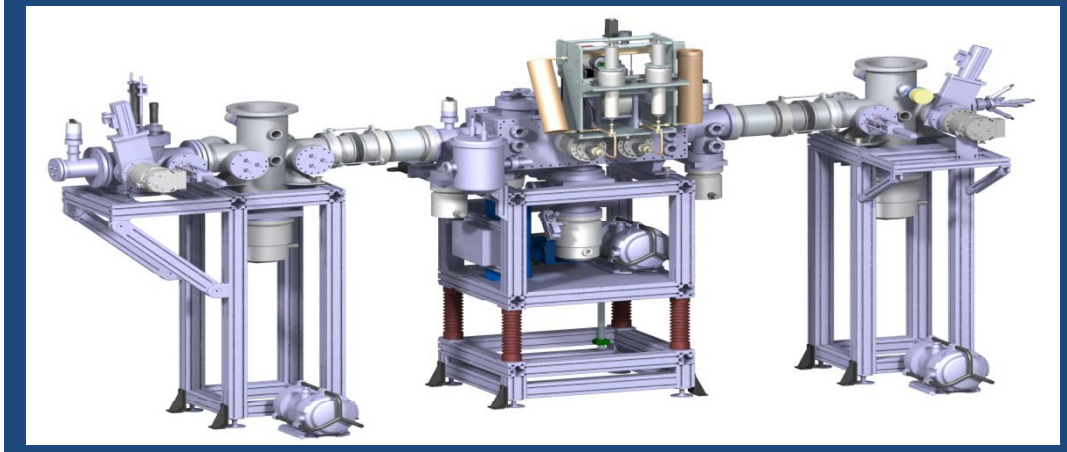
Collaboration Council:
✓ Chaired by the DESIR collaboration spokesperson
✓ DESIR facility coordinator
✓ 1 member for each party
Scientific body

Management board:
✓ DESIR facility coordinator
✓DESIR collaboration spokesperson
✓ 1 LUMIERE representative
✓ 1 BESTIOL representative
✓1 DETRAP representative
Managing body

-> Towards an international MoU in addition to the consortium agreement with the DESIR-EQUIPEX partners (mid 2012)

SHIRaC status report

B. Ramzi, G. Ban, LPC Caen

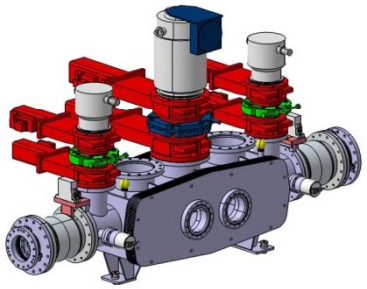


- Test bench fully operational (Dec. 2011)
- µA Cs+ beam, shortened RFQ, emittance-meter

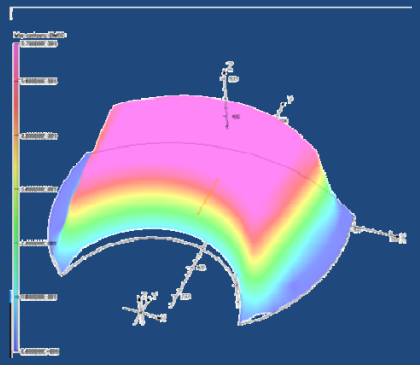
- best µA beam Cooling @2.5Pa & 4.5MHz:
  - RF/ΔE dependence to be investigated
  - Beam optics monitoring to be improved

Intensity (µA)	Transmission (%)	Longitudinal ΔE (eV)
<0.5	>60	~1.3
1	30	~1.2
1	>60	3.5

- HRS /Cooler coupling ~OK
- Next measurement: study of others masses.



- Nuclearization will be done in spring

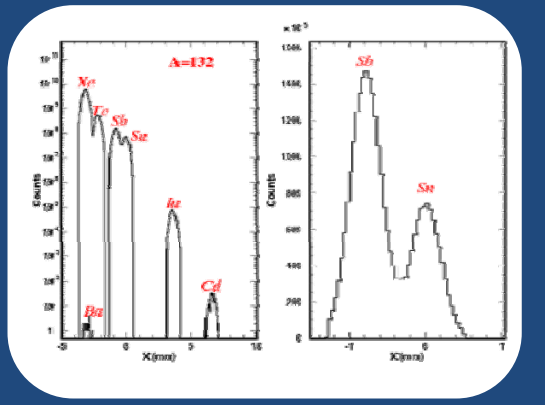


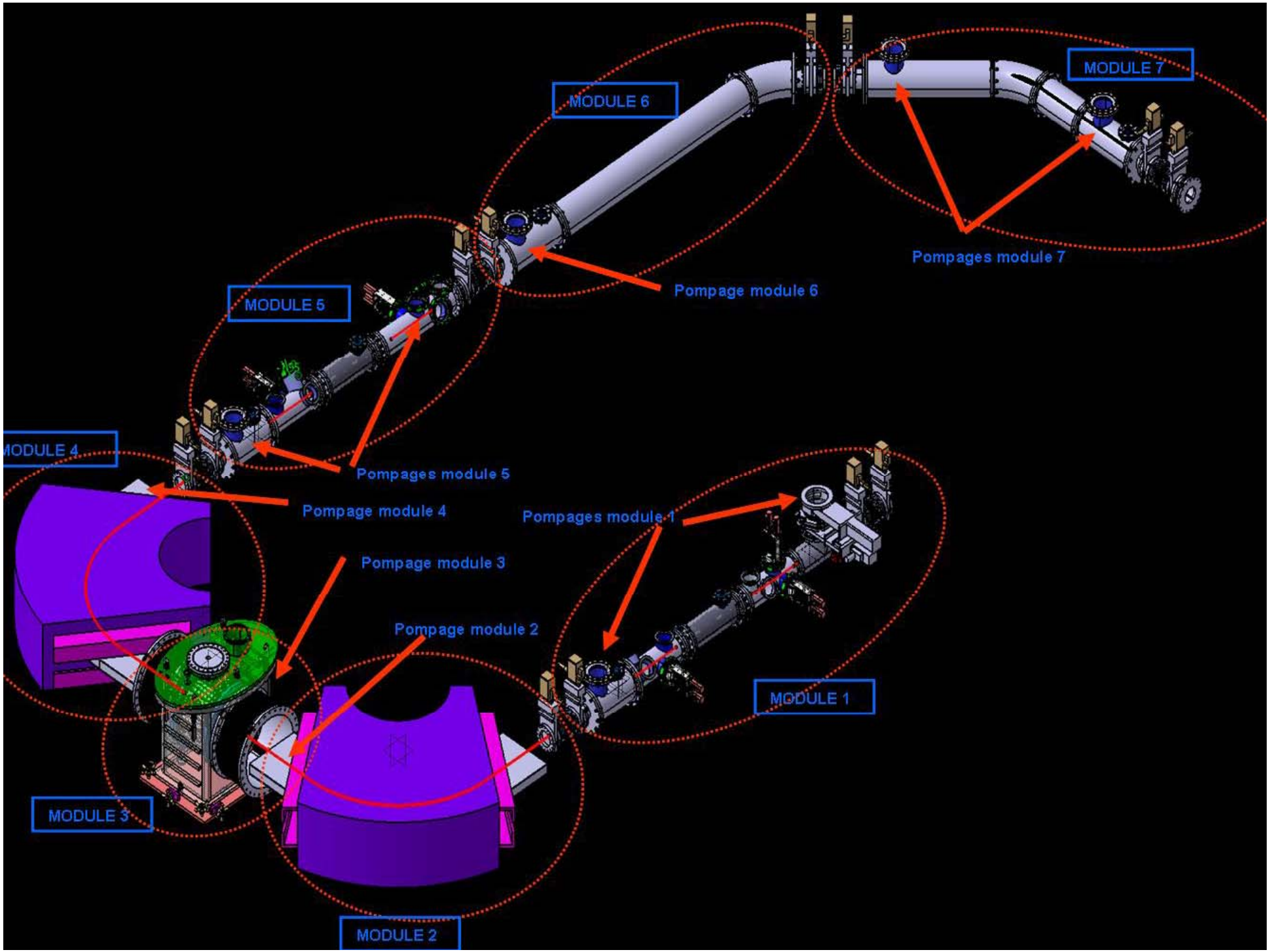
HRS status report

T. Kurtukian-Nieto et al., CENBG

- Global optical design finished and validated at the 2nd DESIR-HRS Workshop, Bordeaux November 17th -18th , 2011.
- Ordering of dipoles 2012 → 400 k€ CPER Basse Normandie.
- Mechanical design and integration in progress.
- Manufacturing of other elements at CENBG.
- Installation at CENBG during 2013 (dedicated assembly hall).
- Tests (transmission, resolution) 2014.
- Transfer to GANIL 2015.

- Monte-Carlo simulations of the expected performances.

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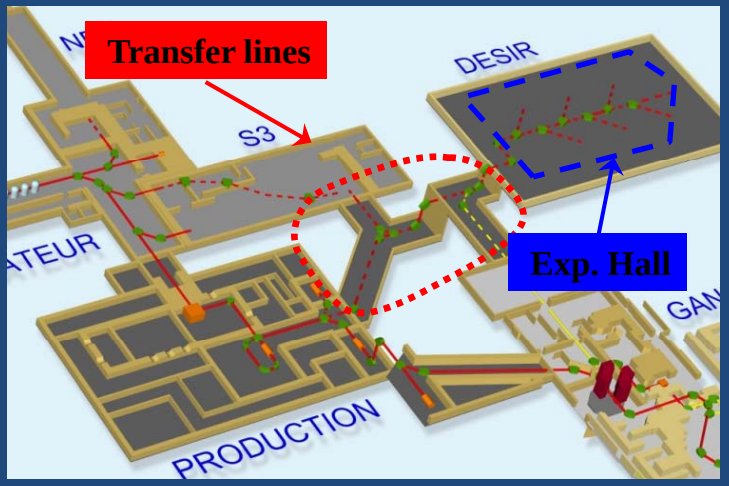
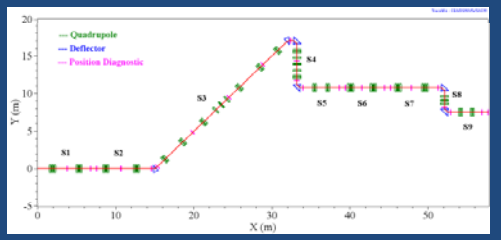
Transport beam lines towards DESIR

L. Perrot, IPN Orsay



Optical characteristics:

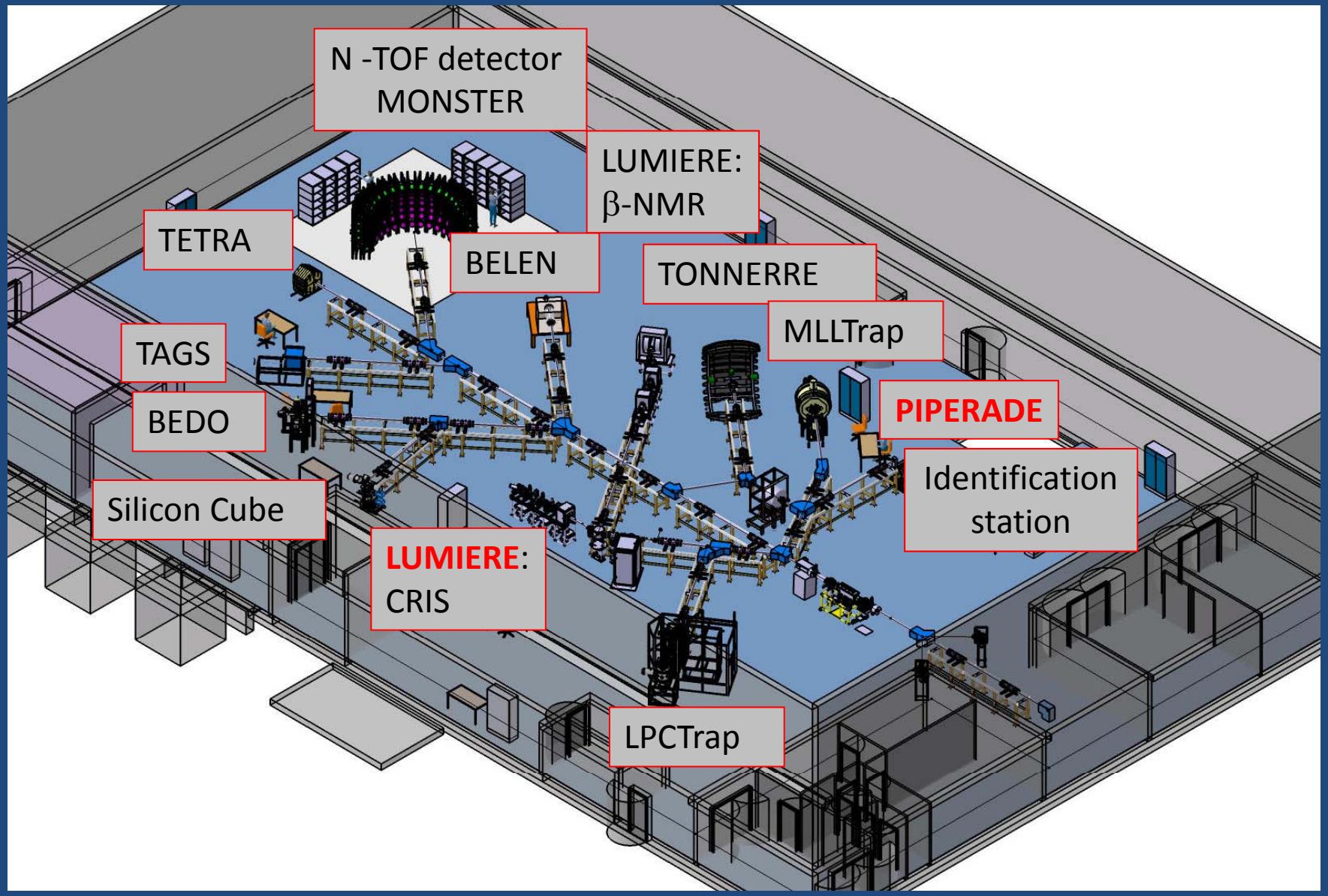
- Transverse emittance : < 20 π.mm.mrad (1 RMS)
- Beam energy : 10keV<E<60keV
- 1+ beam, electrostatic equipments



- All lines calculated using GALOPR and TRANSPORT codes (F. Varenne, GANIL)
- More detailed study in progress using Tracewin, starting with the 70 m long S2 -> DESIR liaison
- Comparison with GICOSY simulation (D. Toprek, VINCA), COSY INFINITY (T. Kurtukian Nieto, CENBG)
- Optimizations of the steerers and beam diagnostics location using Tracewin
- Next steps :
  - ✓ Sensitivity to misalignments and mistuning + beam lines from S1 and S3
  - ✓ Mechanical integration to be studied (IPN Orsay)
  - ✓ Vacuum studies to be performed (GANIL)

DESIR hall installation: towards an optimized layout

B. Blank et al., CENBG



LUMIERE

LUMIERE: current status

M. Bissel et al., IKS Leuven

Physics objectives:

- **Hyperfine structure studies to derive magnetic and quadrupole moments, and isotopic shifts (nuclear shape)**

  -> collinear laser spectroscopy (light collection) : ~10^3 ions/s, 10 MHz res.

- **β-NMR studies of polarized beams (static moments) to further derive spin and parities in the daughter nucleus (initiated at TRIUMF)**

Recent technical advance:

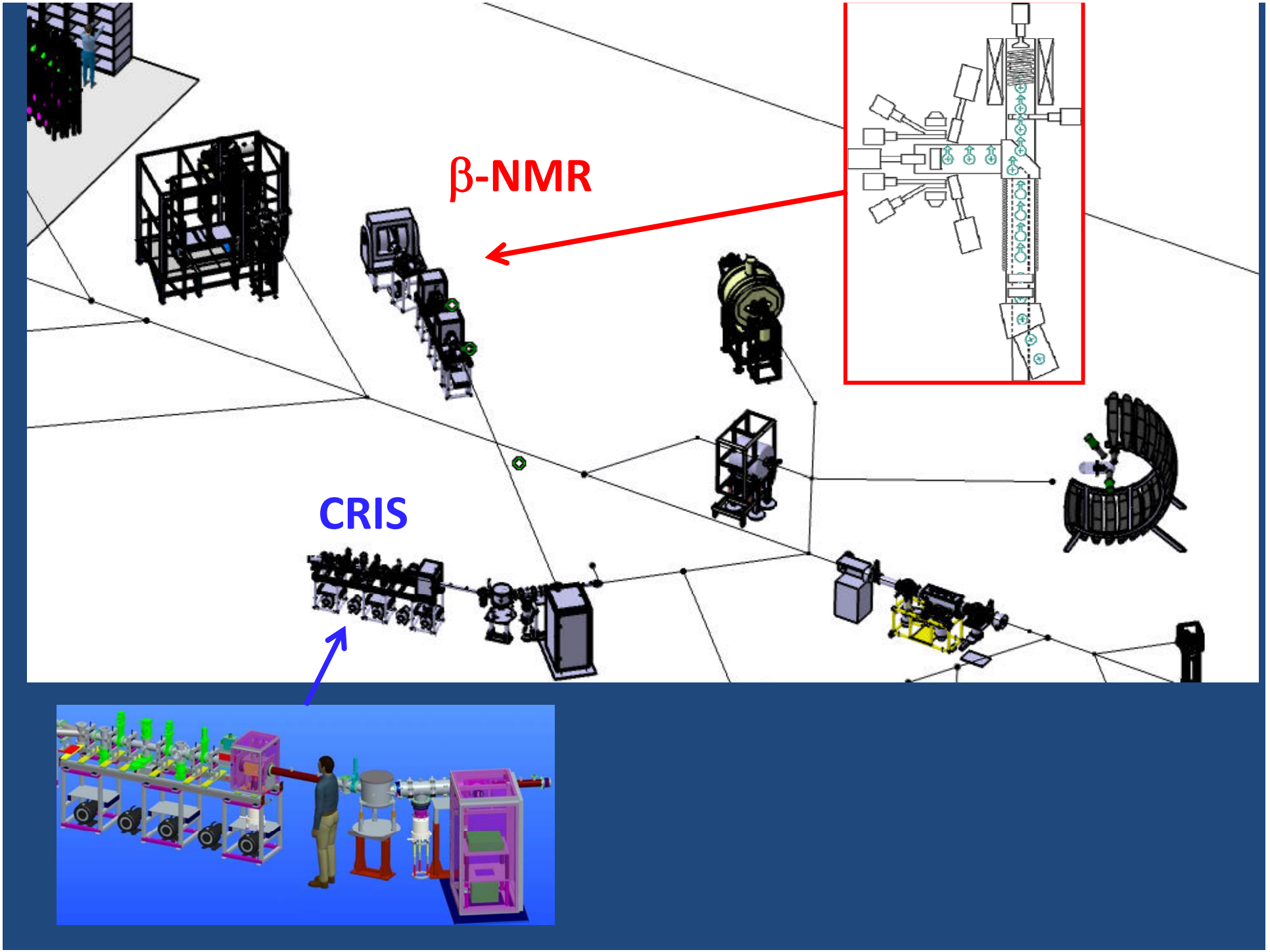
- **Implementation of the Collinear Resonant Ionization Spectroscopy (CRIS) technique at ISOLDE -> higher sensitivity (few ions/s), worst resolution (100 MHz)**

LUMIERE strategy:

- **Combine both techniques and additionally feed BESTIOL with polarized beams**

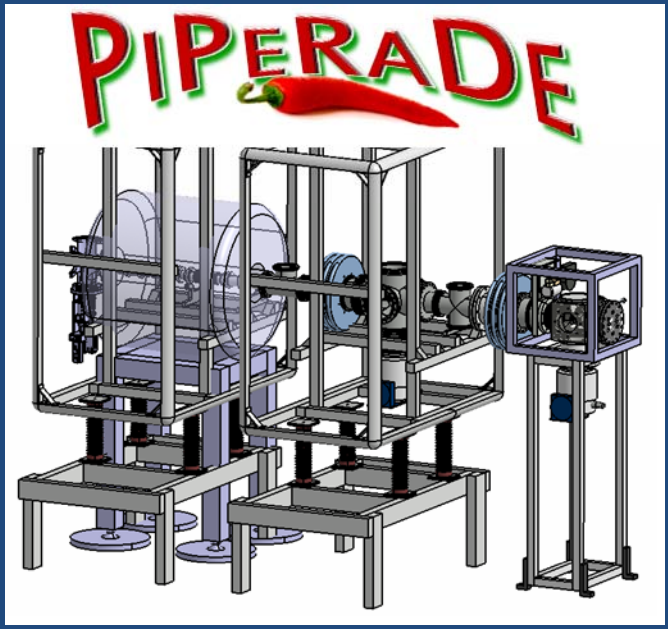
  -> CRIS commissioning undergoing at ISOLDE (p-deficient Fr isotopes)

  -> Layout of the LUMIERE optical lines


β-NMR
CRIS

PIPERADE: first steps

S. Grévy et al., CENBG



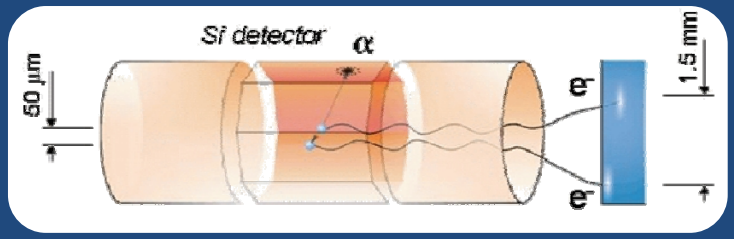
- RFQ cooler and buncher (GPIB) + double Penning trap system for purification and accumulation: $M/\Delta M \sim 10^5$, up to 10^6 ions
- Precision measurement, decay spectroscopy, etc…

- Funded in 2010: ANR + Région Aquitaine + Univ. Bordeaux 1 + CNRS/IN2P3 + Partners -> 1.2 M€
- Coll. CENBG, LPC, GANIL (RFQ) + CSNSM, MPI Heidelberg (Penning traps)

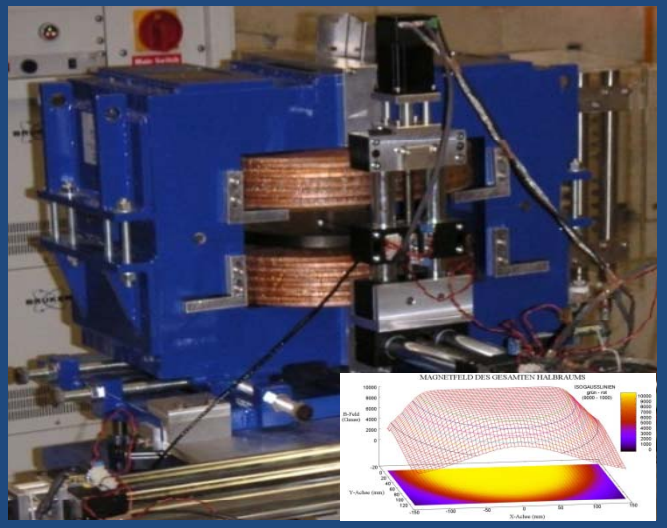
MLLTrap: ongoing work

P.G. Thirolf et al., LMU München

- R&D for in-trap decay spectroscopy
  - ✓ 4 Si detectors inside the Penning trap to perform alpha spectroscopy
  - ✓ High B fields, cryogenic temperatures, HUV constrains



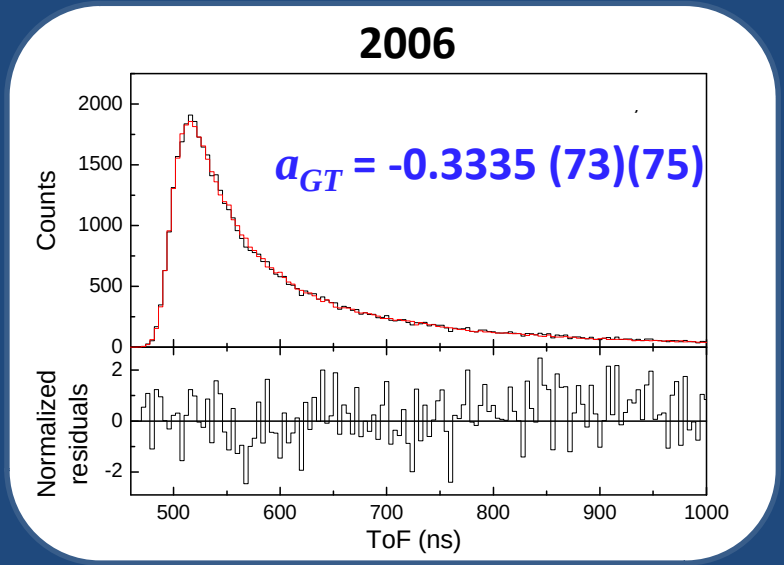
- Multi-Passage Spectrometer (MPS)
  - ✓ A/q separation before the trapping of n+ ions
  - ✓ Based on a fast cycling magnet
  - ✓ Field mapping performed
  - ✓ Next steps: optical simulations, design and manufacturing



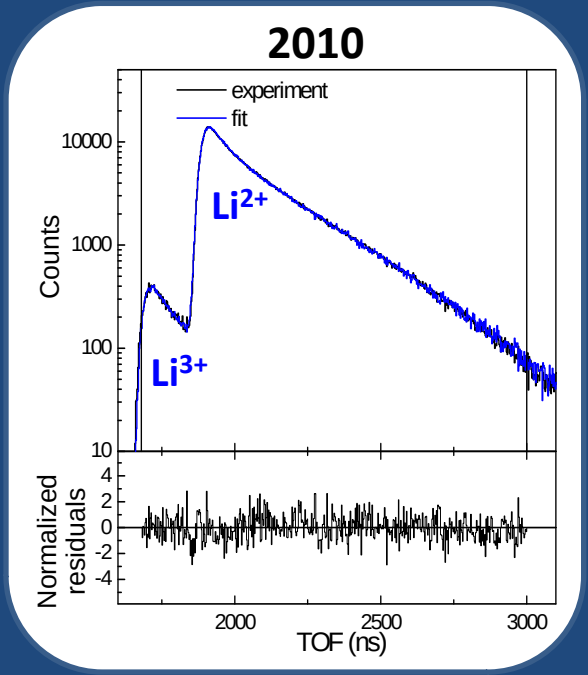
Measurement of $a_{\beta\nu}$ & $P_{shakeoff}$ in ^{6}He & ^{35}Ar @LIRAT with LPCTrap

E. Liénard et al., LPC Caen

- $^{6}He^{1+}$

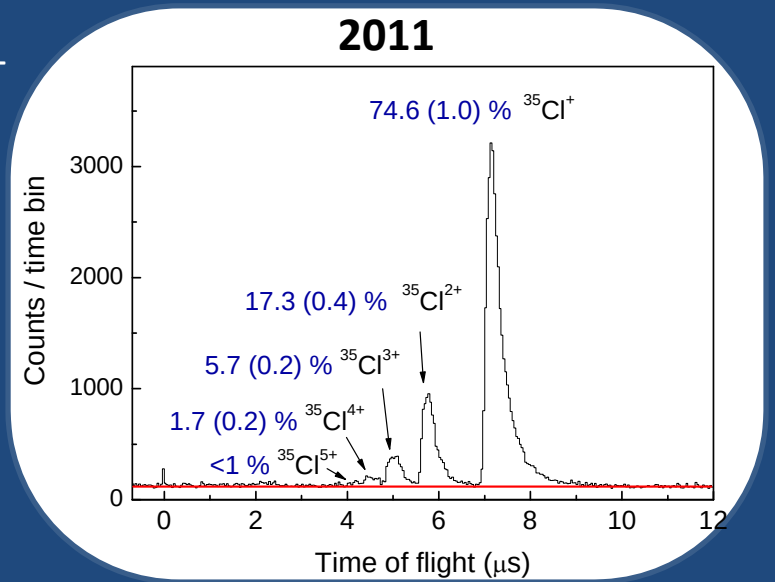


Fléchard et al., JPG38(2011)



- $(\sigma_a/a)_{stat}$ ~ 0.5%
- $P_{shake\text{-}off}$ = 0.02349(32)(15) in excellent agreement with P_{theo} = 0.0233

- $^{35}Ar^{1+}$



Tests performed in June with ^{35}Ar (32 h)

- $(\sigma_a/a)_{stat}$ ~ 1.1%
- First measurement of charge state distributions of recoiling ions
- Experiment accepted by the GANIL PAC

DESIR @ SPIRAL2

http://www.cenbg.in2p3.fr/desir

Short-term DESIR Milestones

- EQUIPEX project: funding distribution, consortium agreement: mid-2012
- Optimization of the experimental hall layout : mid-2012
- Beam lines detailed design study: end 2012

DESIR construction and funding -> call for a meeting of all the agencies involved ASAP