

GANIL/SPIRAL2 PAC ISSUES

3rd FCG Meeting

Hervé Savajols

on behalf of the GANIL management

www.ganil-spiral2.eu



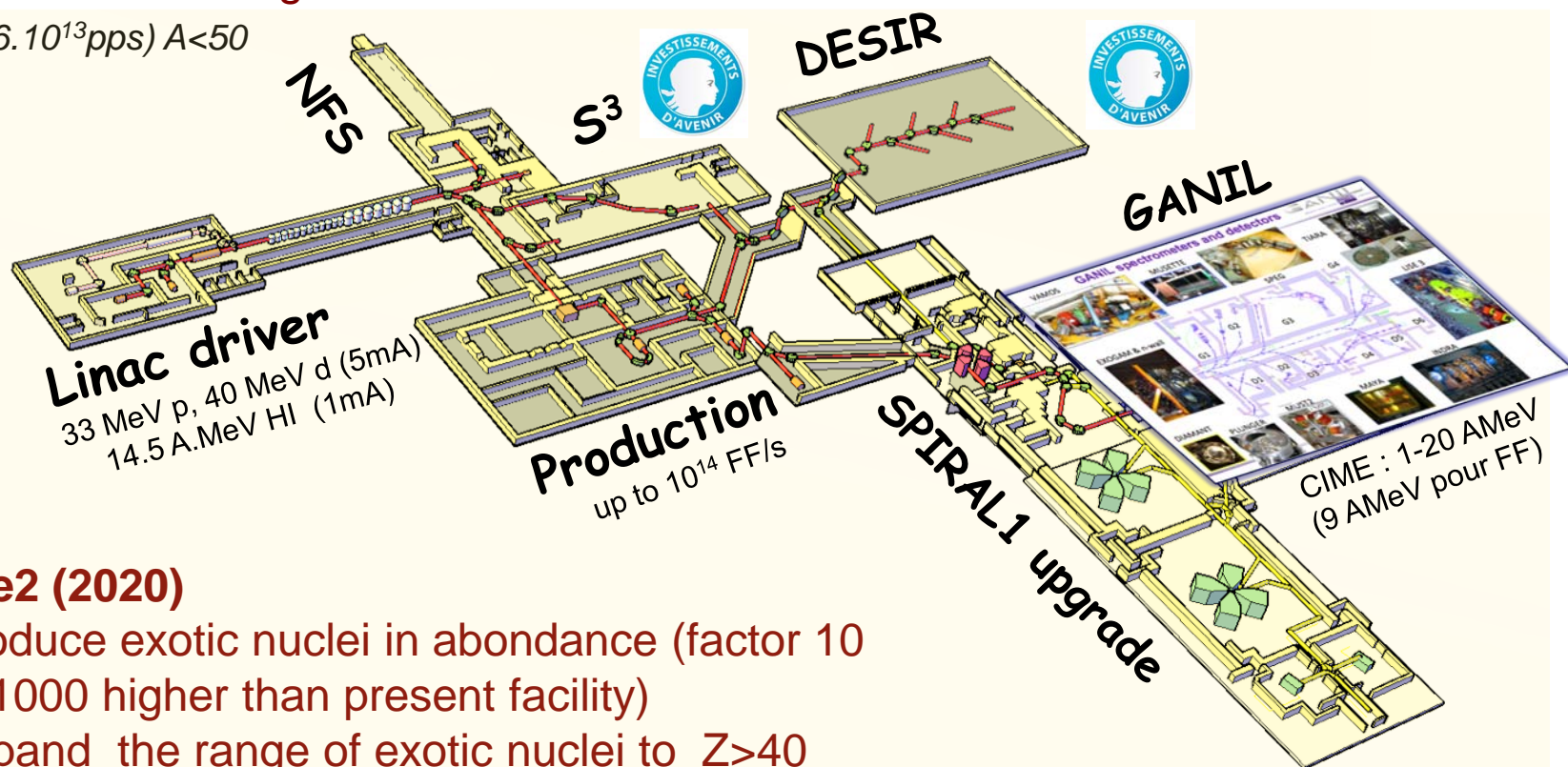
Phase1 (2015)

Increase the intensity of stable beams by a factor 10 to 100 – High intense neutron source

$10\mu\text{A}$ ($6 \cdot 10^{13}\text{pps}$) $A < 50$

DESIR (2017)

(low energy facility)



Phase2 (2020)

- Produce exotic nuclei in abundance (factor 10 to 1000 higher than present facility)
- Expand the range of exotic nuclei to $Z > 40$
 $A > 80$
- Post-acceleration of high intensity RIB

SPIRAL1 Upgrade (2015)

New light n-deficient nuclei from beam/target fragmentation

- Cyclotrons: $\leq 10^{13}$ pps, du C à U, 1 MeV/n - 95 MeV/n
- LINAC SPIRAL2 (baseline project) $\leq 10^{15}$ pps from p to Ni, 0.75 MeV/n – 15 MeV/n

Rare stable-isotopes ^{36}S , $^{40,48}\text{Ca}$, ^{50}Ti , ^{58}Ni , & unique in Europe ^{208}Pb , ^{238}U

- Prod. or pred. stable beams
- Prod. or pred. radioactive beams
- Non-prod. stable beams
- Non-prod. radioactive beams

LINAC SPIRAL2 $A/Q=6-7$ (future option)

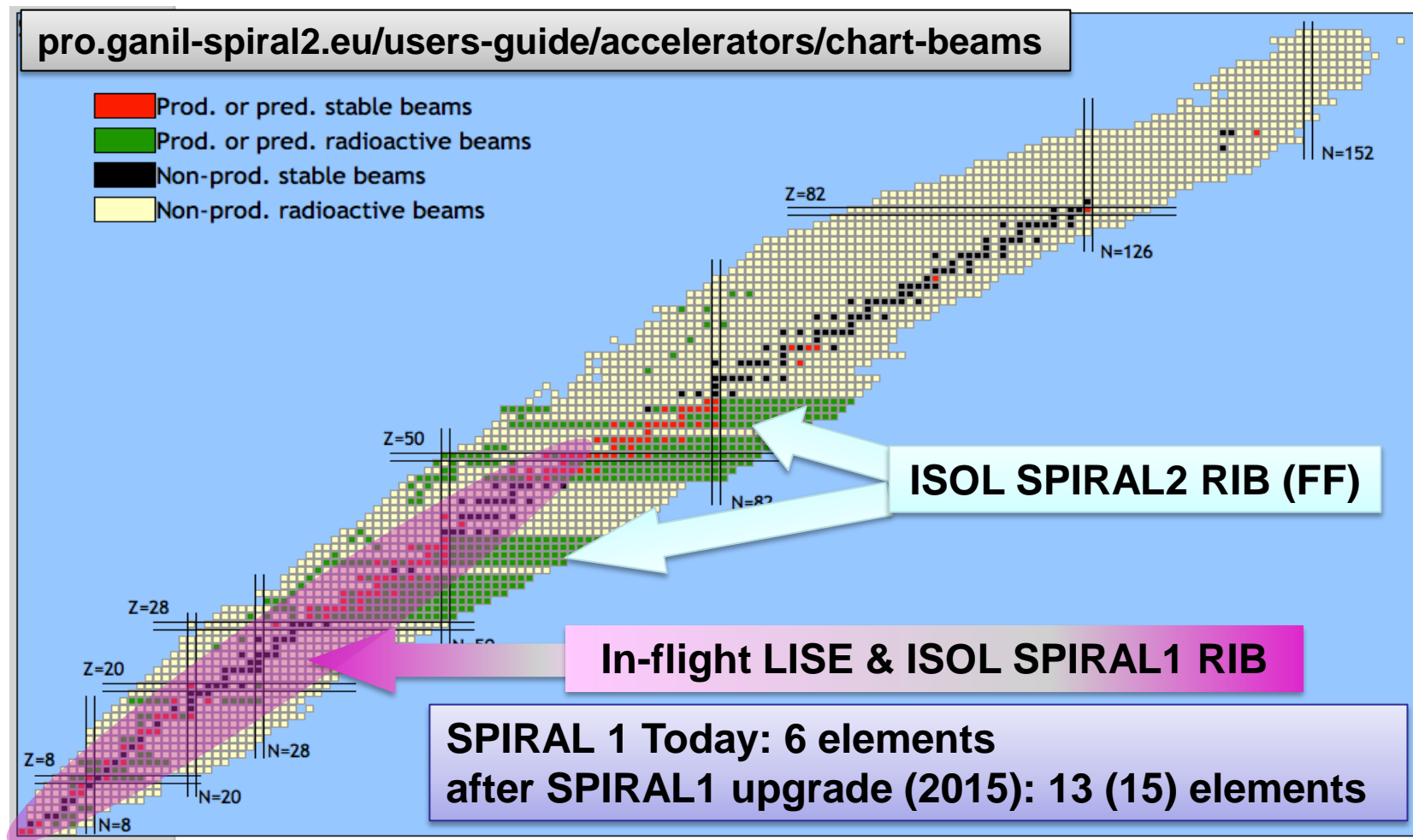
LINAC SPIRAL2 $A/Q=3$

Cyclotrons of GANIL

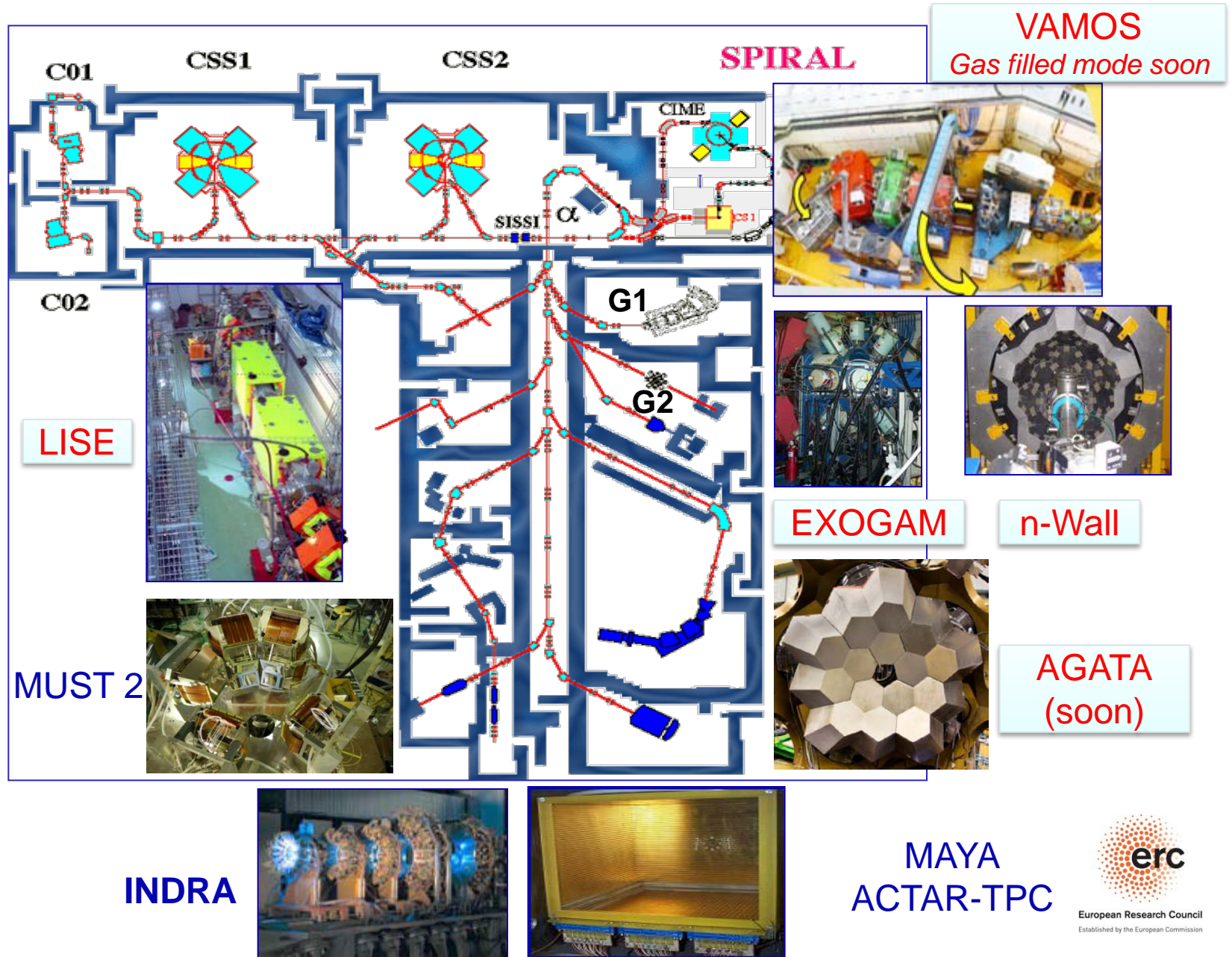
pro.ganil-spiral2.eu/users-guide/accelerators/chart-beams

Radioactive Ion Beams GANIL/SPIRAL1&2

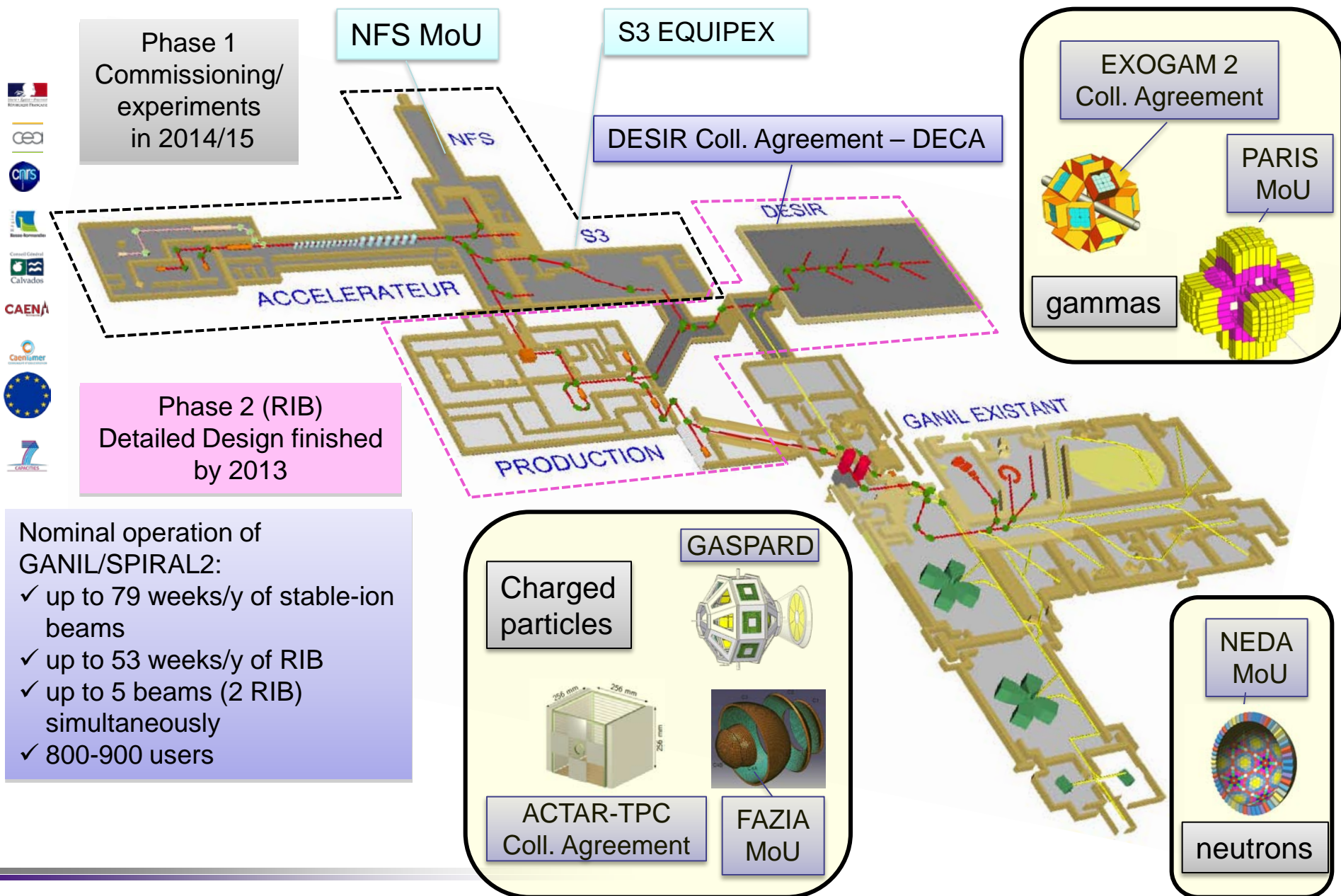
- RIB by in-flight at LISE: few MeV/n to 50 MeV/nucl. ($\approx 30\%$ of beam time today)
- ISOL RIB from SPIRAL 1 & 2: $\leq 60\text{keV}$ et 1-15 MeV/nucl.



GANIL accelerators and detectors



GANIL/SPIRAL 2 facility: status & outlook



Civil Construction

100 % of the concrete done (14000m³)



Feb 2011



May 2011



May 2012



Oct 2011



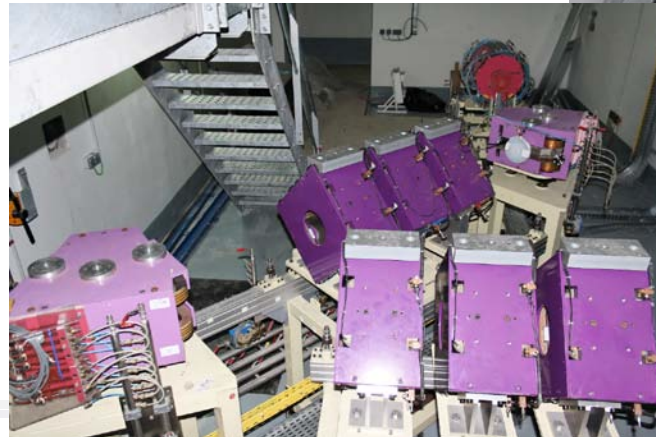
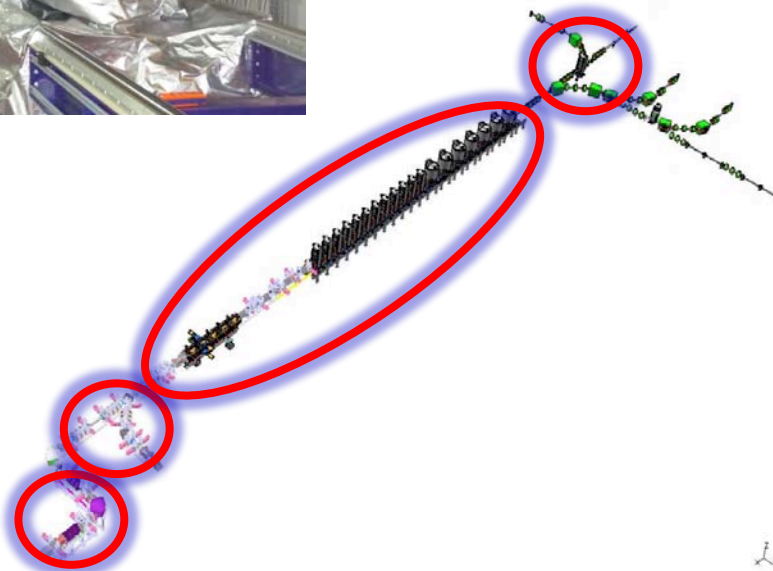
Oct 2012



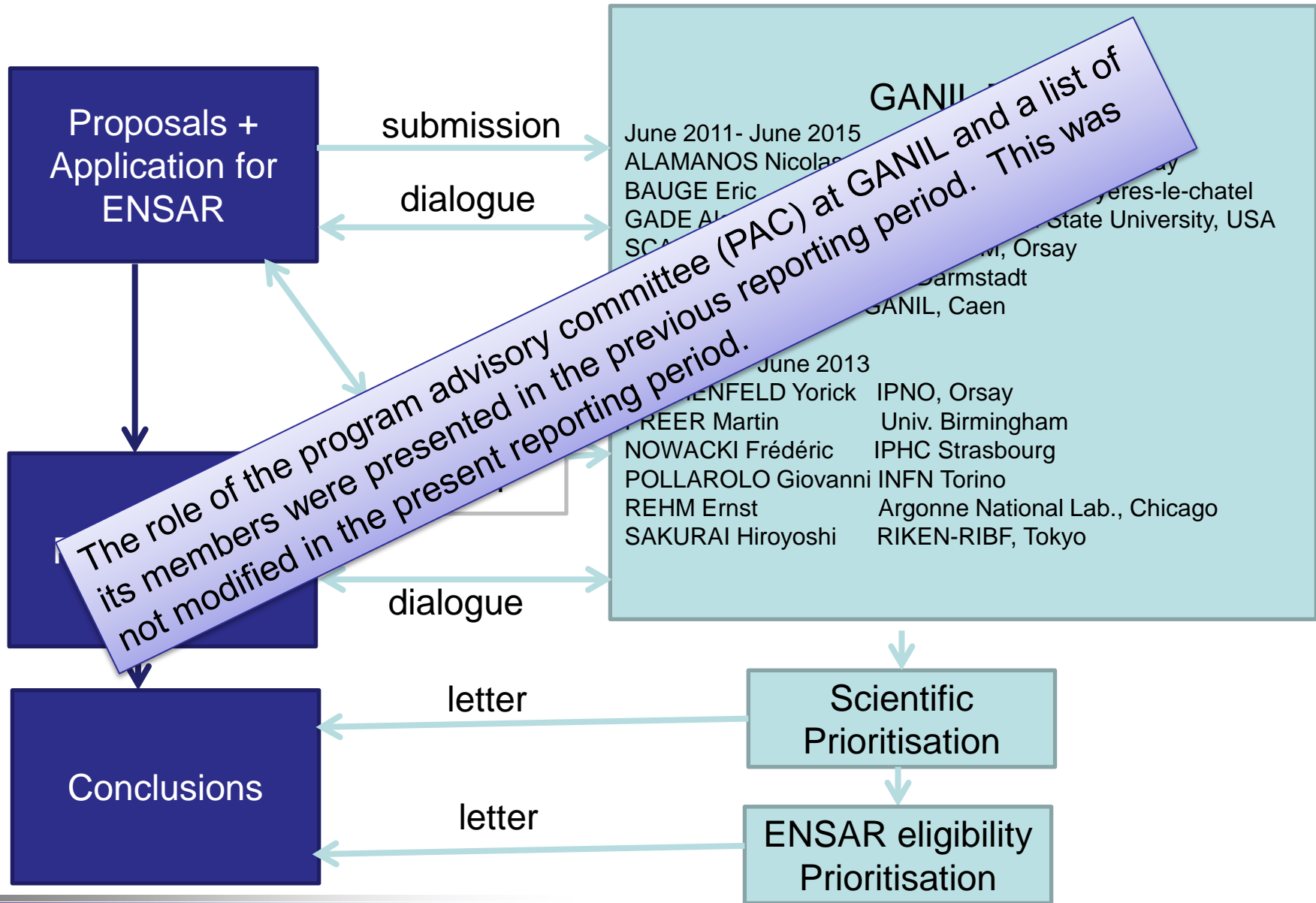
March 2013



Installation is ongoing

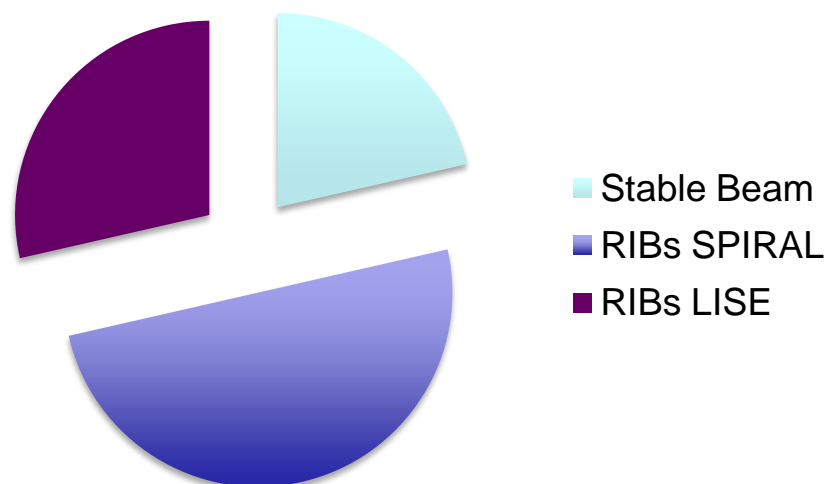


Proposal Submission and Approval

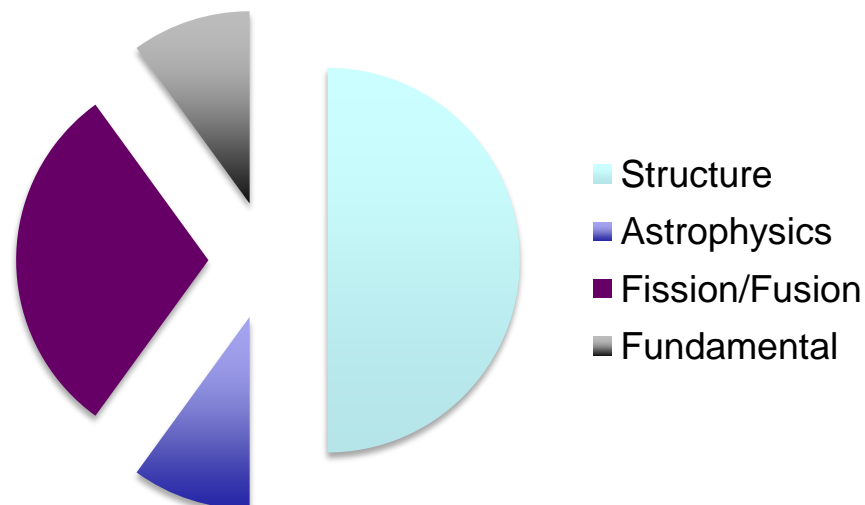


- November 2011: 16 experiments proposed with a total of 376 UT's requested (~125 days). A total of 182 UT's were accepted (7/16 approved)
- October 2012: 14 experiments proposed with a total of 379 UT's requested (~126 days)
- For interdisciplinary research, a PAC meeting was held on April 9th, 2013 in Paris

Requested beams (2012-2013)



Physics Program (2012-2013)



Experiments approved, PAC October 2012

10 experiments were approved for a total of 80 days (239 UT's)

Exp #	Spokespersons	Recommended UT's	Recommendations
E656	J.Piot, P.Greenlees	49	Highest priority
E646S	E.Lienard, X.Flechard	30	Accepted
E647	C.Wheldon, M.Freer	15	Accepted
E650	G.Neyens, J.C.Thomas	16	Accepted
E651	M.Morjean, D.Jacquet, A.Drouart	35	Accepted
E652	S.Grevy, P.Ascher	21	Accepted
E653	C.Rodriguez-Tajes, F.Farget	23	Accepted
E655S	A.Gillibert, F.Flavigny	21	Accepted
E657	A.Corsi, S.Peru	24	Accepted
E658S	P.Ujic, F.de Oliveira	5	Accepted

Experiments approved for ENSAR TNA support after Oct 2012 PAC

- 1) E647 (C.Wheldon et al.) 15 UT's "Does alpha clustering persist into fp-shell nuclei?"
- 2) E650 (G.Neyens et al.) 16 UT's "Deformation of the isomeric 1p1h intruder state in ^{34}Al "
- 3) E652 (P.Ascher et al.) 21 UT's "Towards the discovery of two-neutron radioactivity"
- 4) E658S (P.Ujic et al.) 5 UT's "Ultra high-precision measurement of the half-life of ^{19}Ne "

Total = 57 UT's approved for TNA support from 2012 PAC

During the reporting period PR2 (March 1, 2012 – August 31, 2013)

- 1058.48 experimental hours were delivered
- 92 stays were financed
- 62 different individual users visited the facility
- 860 days were spent at GANIL by these users
- 26% were women
- 37% were new users

Career breakdown of the 62 individual users supported: 32 are experienced researchers, 10 postdoctoral fellows, 18 graduate students, and 2 undergraduate students.

In the present reporting period of 18 months the facility was operated for only 5 months between March 2012 to July 2012 and again for 1 month July 2013.

ENSAR support to users:

➤ Number of beam hours promised:	3500
➤ Full contract Number of beam hours 01/09/2010 - 31/ 08/2013:	3215
➤ Estimated number of Users:	280
➤ Full contract Number of Users 01/09/2010 - 31/ 08/2013:	201
➤ Estimated number of days:	3200
➤ Full contract Number of days 01/09/2010 - 31/ 08/2013:	2269
➤ Total amount for T&S :	338 800€
➤ Full contract Amount for T&S 01/09/2010 - 31/ 08/2013:	210 070€
➤ Amount for other direct costs - full contract (AGATA):	80 000€
➤ Amount for other direct costs (AGATA) 01/09/2010 - 31/ 08/2013:	0€
➤ Access costs:	350 000€
➤ Full contract Access costs 01/09/2010 - 31/ 08/2013:	327 064 €

GANIL Users meeting

The purpose of this conference was to review and discuss research performed at GANIL and related activities carried out at similar facilities around the world.

Traditionally, this meeting covers the range of physics topics that are studied at GANIL including:

- Nuclear structure
- Reaction mechanism
- Nuclear astrophysics
- Weak interaction
- Interdisciplinary research

The main theme of this year's Colloque was **“Links between current scientific activities and SPIRAL2”**

A total of 148 participants attended the meeting.

XVIIITH COLLOQUE GANIL PORT EN BESSIN (NORMANDY) - FRANCE

23RD TO 27TH SEPTEMBER 2013

Nuclear structure
Reaction mechanism
Nuclear astrophysics
Weak interactions
Interdisciplinary research

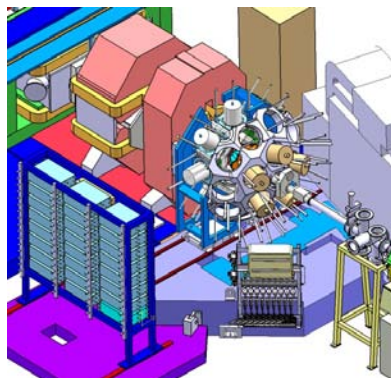
GANIL - BP 55027
14076 CAEN CEDEX 5 - France
colloques@ganil.fr
<http://pro.ganil-spiral2.eu/events/cw/colloques/2013>

The poster features a background image of a golf course with green fairways and sand traps. Overlaid on the image are several circular logos of participating institutions, including CERN, DESIR, and others. At the bottom, the GANIL and spirall2 logos are prominently displayed.

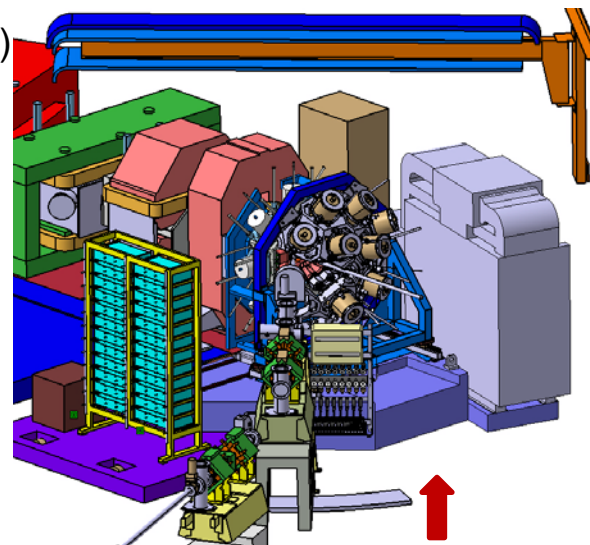
Organizing Committee
 Marlène ASSIE, IPN Orsay, France
 Emmanuel BALANZAT, CIMAP Caen, France
 Michael BLOCK, GSI Darmstadt, Germany
 Stéphane GREVY, CEN Bordeaux-Gradignan, France
 Geoff GRINVER, GANIL Caen, France
 Emily LAMOUR, INSP Paris, France
 Antoine LEMASSON, GANIL Caen, France
 Marie-Delphine SALSAC, CEA/IRFU/SPH Saclay, France
 Hervé SAVAIGOLS, GANIL Caen, France (chairman)
 Kamila SIEJA, IPHC Strasbourg, France
 Piet VAN DUPPEN, IKS/KU Leuven, Belgium
 Giuseppe VERDE, INFN/LNS Catania, Italy

Total Eff. $\leq 15\%$ at 1.3 MeV, $M=1$

At 0° as separator (vacuum/gas-filled)

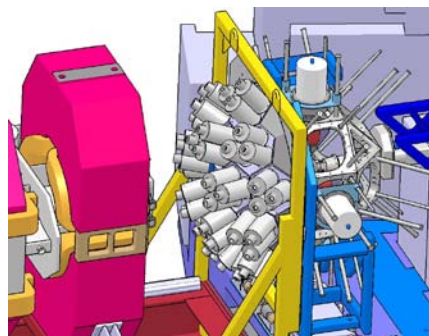


n-wall

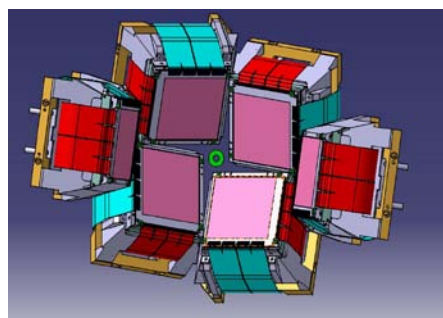


Angles $>10^\circ$ deg
for fission & MNT

In G1 coupled to VAMOS (+ EXOGAM2): SIBs, RIBs



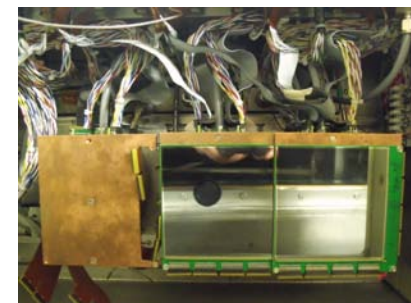
MUST II



+ Cryogenic target

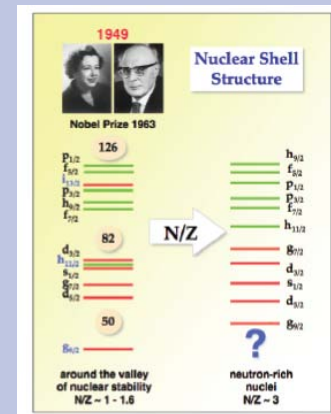
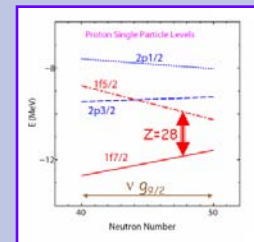
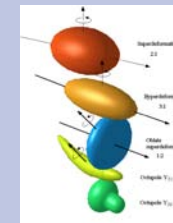
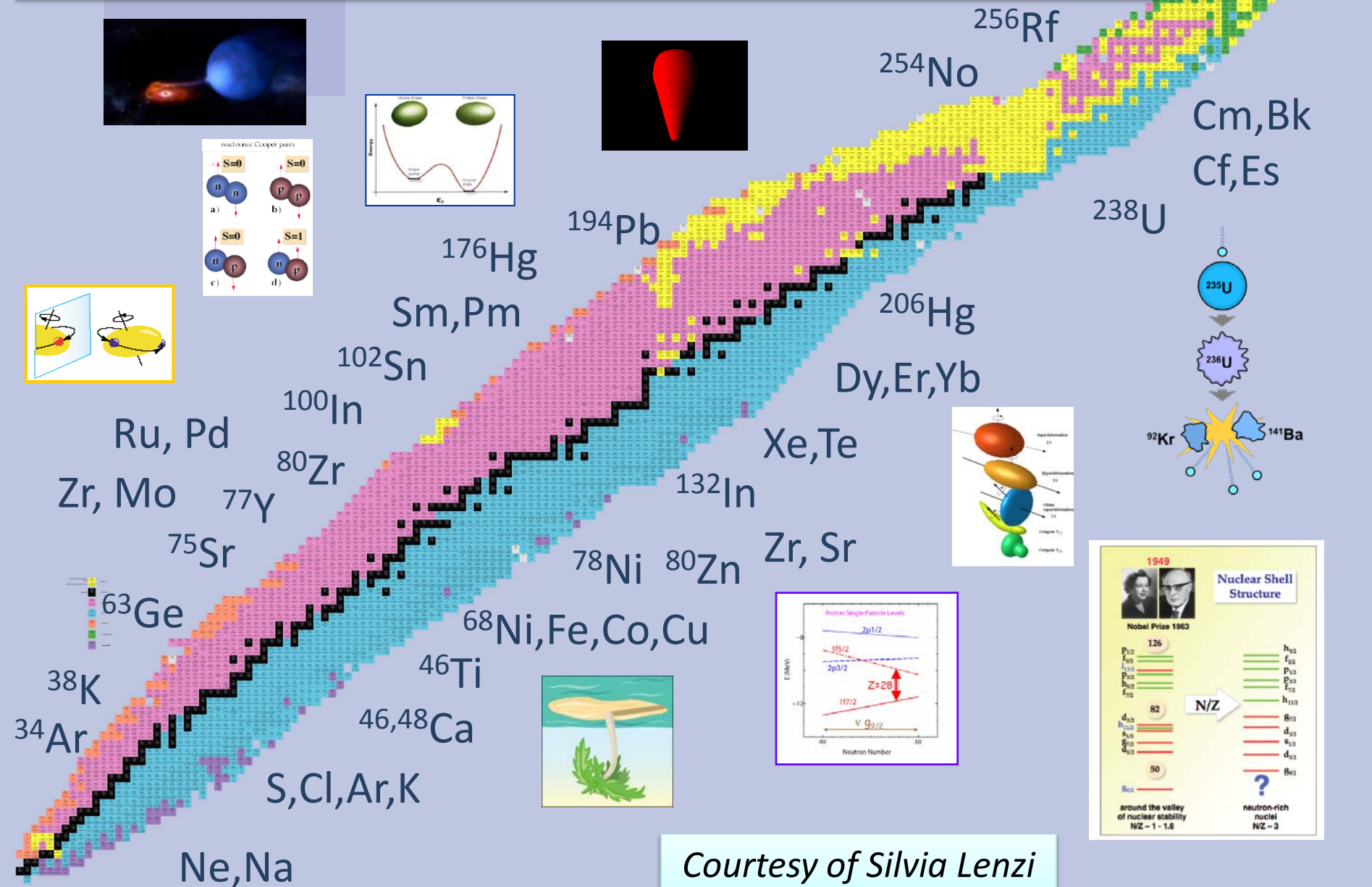
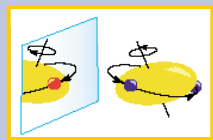
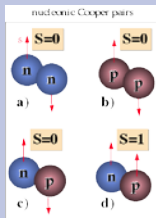
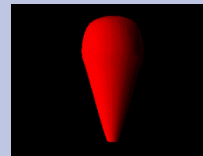
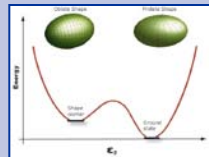
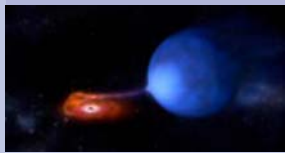
- ☐ Charged particle array for transfer reaction
MUST2/TIARA : (d,p) etc ... program with SIB and RIB
- ☐ Charged particle array for prompt tagging :
DIAMANT
- ☐ Charged particle array for Recoil Decay Tagging : *MUSETTE*
- ☐ Neutron detectors: *n-wall*
- ☐ Scintillators : *BaF2 array, LaBr3*
- ☐ Future detector : *NEDA (n) , GASPARD (MUST2-like), PARIS (LaBr3)*

MUSETTE



Physics case for the AGATA campaign in GANIL

Workshop February 2013 : 47 Lols (669 days of beam requested)



Courtesy of Silvia Lenzi

Near Future (2014)

- Next PAC meeting : Spring 2014 (open to AGATA Campaign)
- Beam time : Two periods in 2014
 - March-May (3 months) : Stable beams– Lise RIBs (No SPIRAL)
 - Mid October – Mid December : Stable beams only with CSS1
- First AGATA experiment end 2014

Next Subcampaigns to be adjusted with upgraded planning

 1. (2015): VAMOS in vacuum (Spectro+plunger)
 2. (2015-2016): gas-filled/NEDA: Depend of the availability of these setups
 3. (2016- ?) : SPIRAL1 : DSSD-Coulex, MNT

We (as are most labs) are asking for an extension to use ENSAR TNA funds for GANIL it is important to use the AGATA part (80 k€).

Great opportunities in the coming years for an exciting physics program at GANIL/SPIRAL1/SPIRAL2 and with AGATA@GANIL

Beginning of operation of SPIRAL2 Phase 1 with NFS from the beginning of 2015 and S3 from the beginning of 2016

≥ 5 month/year of beam at GANIL cyclotrons in 2014-2016
Operation with upgraded SPIRAL1 with delivery of new radioactive beams from 2016

Commitment of GANIL to host of AGATA until end of 2016 with ≥ 6 months of beam = about 32 ± 3 experiments
A possibility to extend the AGATA campaign to 2017