



SPIRAL2: Status Report and DESIR@SPIRAL2

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*on behalf of the SPIRAL2 Project Team
and Physics Collaborations*



GANIL/SPIRAL1/SPIRAL2 facility



SP2 Beam time: 44 weeks/y
 GANIL Beam time: 35 weeks/y
 ISOL RIB Beams: 28-33 weeks/y
 GANIL+SP 2 Users: 700-800/y

LINAC:
 33MeV p
 40 MeV d
 14.5 AMeV HI

Neutrons For Science

S3 separator-spectrometer

DESIR Facility
 low energy RIB

A/q=6 Injector option

GANIL/SPIRAL 1
 today

A/q=2 source
 p, d, ^{3,4}He 5mA

HRS+RFQ Cooler

A/q=3 HI source
 Up to 1mA

RIB Production Cave
 Up to 10¹⁴ fiss./sec.

CIME cyclotron RIB at 1-20 AMeV
 (up to 9 AMeV for fiss. fragments)

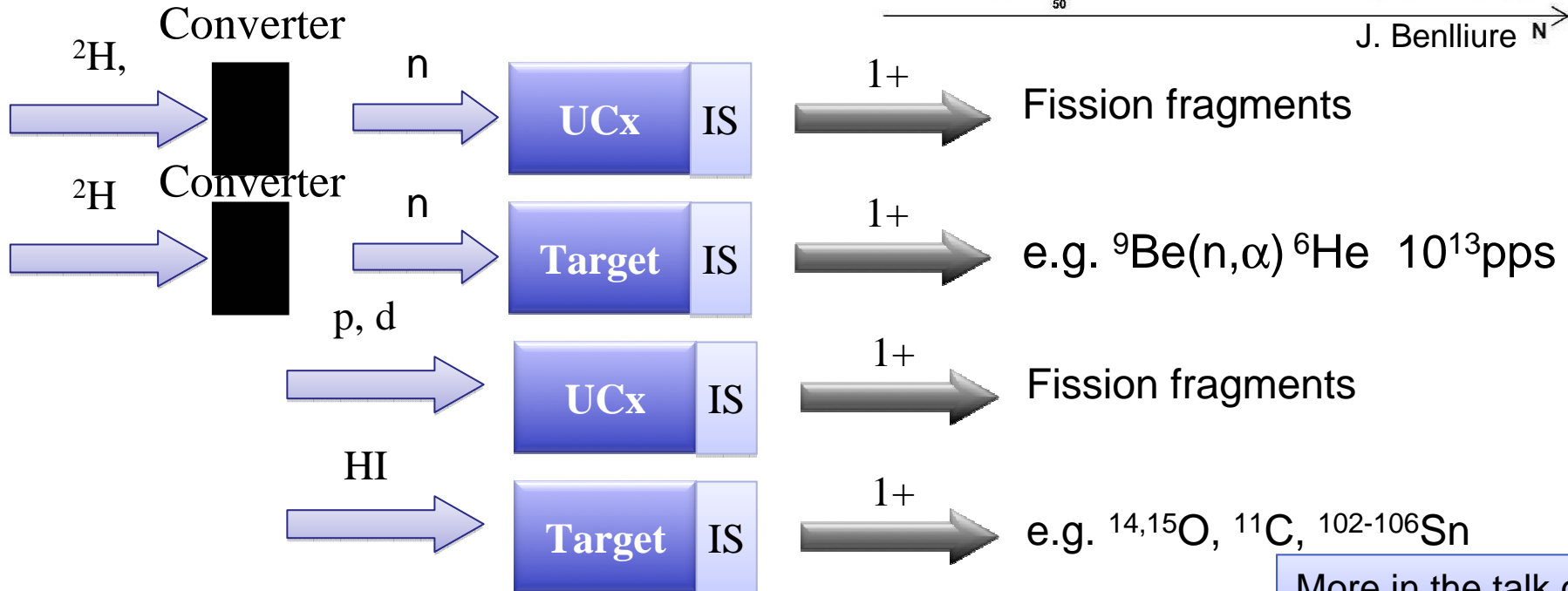
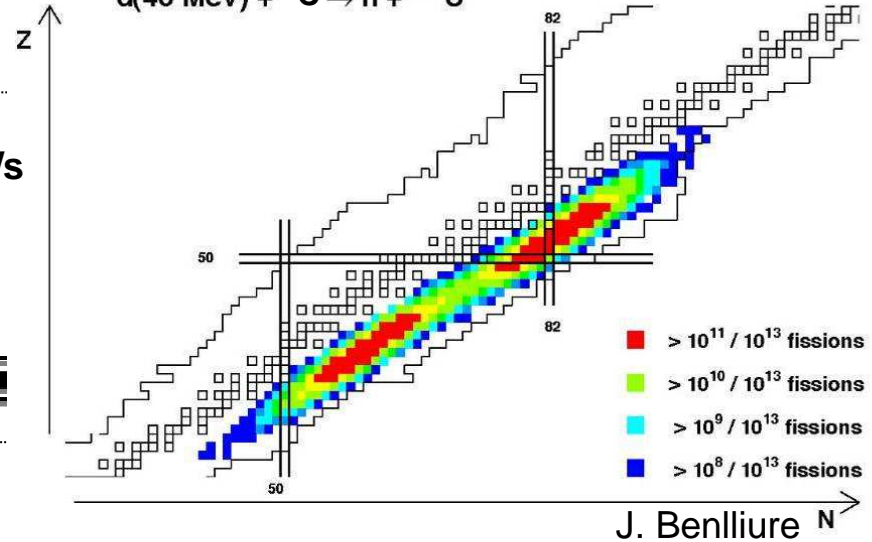
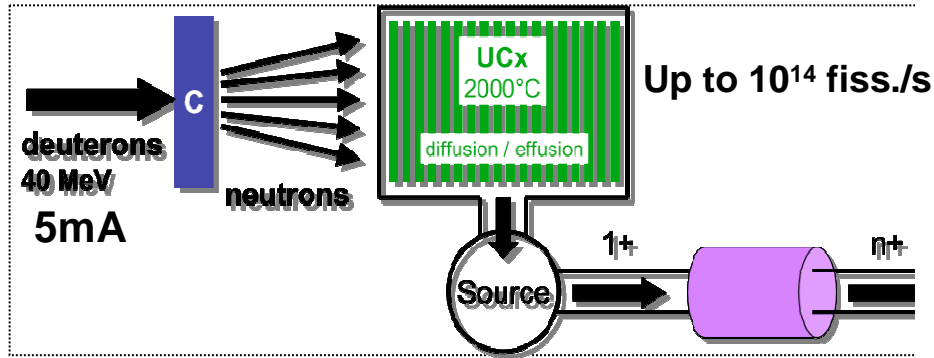
**Cost: 200M€
 Funded**

SPIRAL2 is one of the ESFRI list projects (40 most important EU research infrastructure projects)



ISOL Rare Isotope Beams at SPIRAL 2

Up to 2.3 kg HD UC₂



More in the talk of P. Delahaye

Regions of the Chart of Nuclei Accessible with SPIRAL 2 Beams : LINAC & RIB

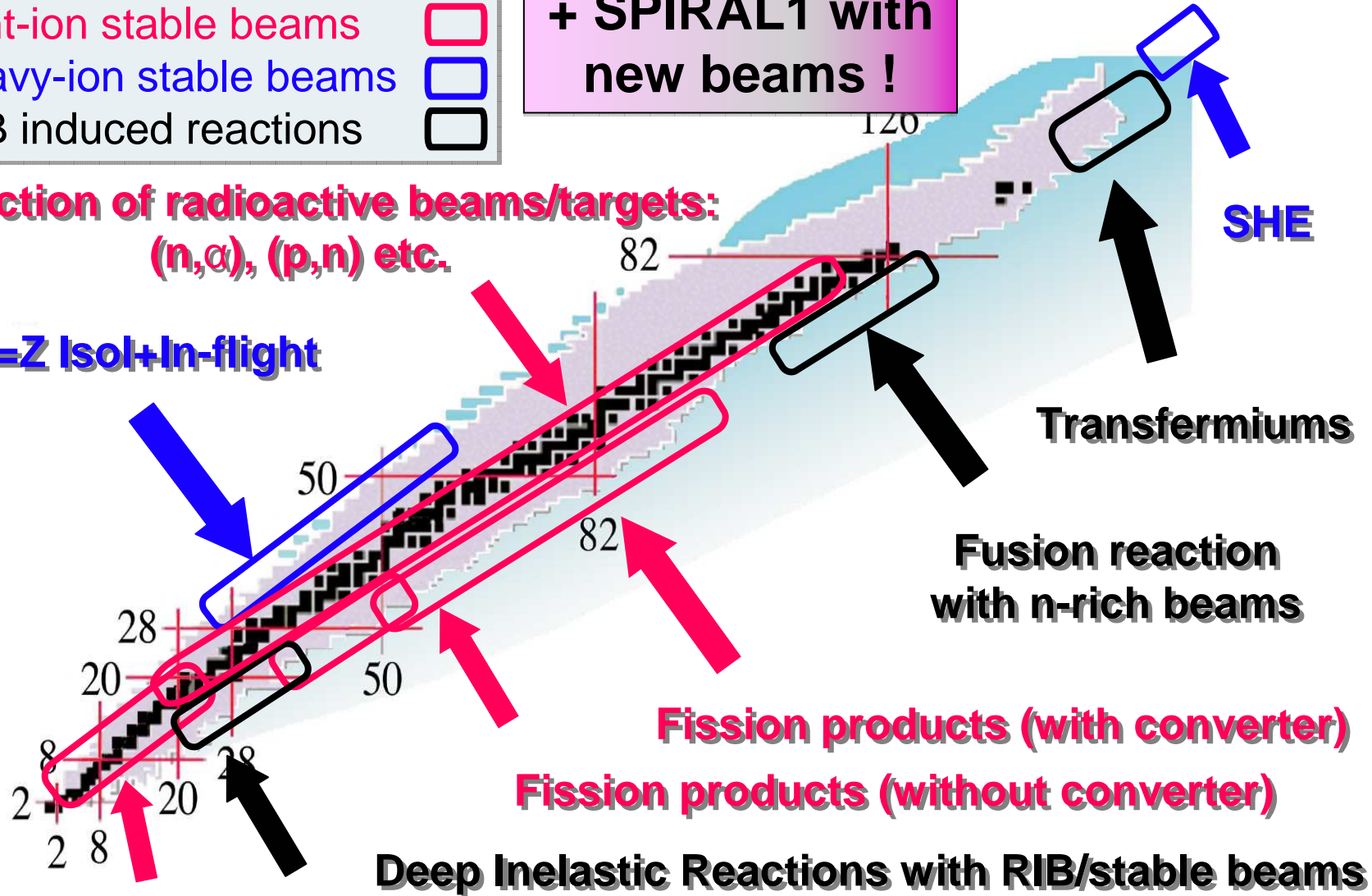


- ⇒ light-ion stable beams
- ⇒ heavy-ion stable beams
- ⇒ RIB induced reactions

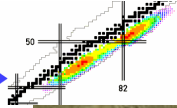
+ SPIRAL1 with new beams !

Production of radioactive beams/targets:
(n,α), (p,n) etc.

N=Z Isol+In-flight



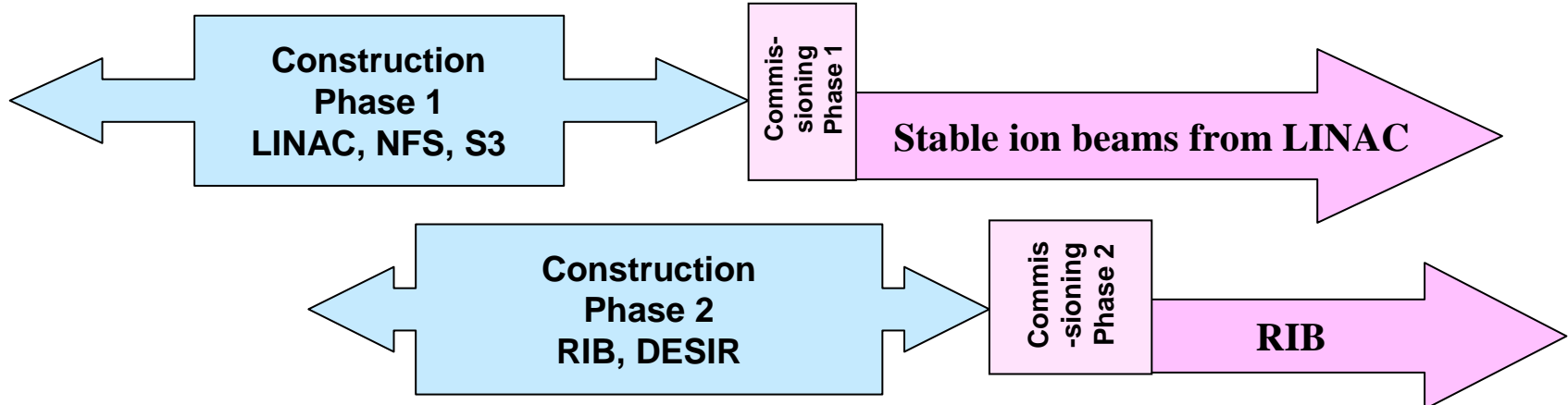
High Intensity Light RIB



SPIRAL 2 timeline

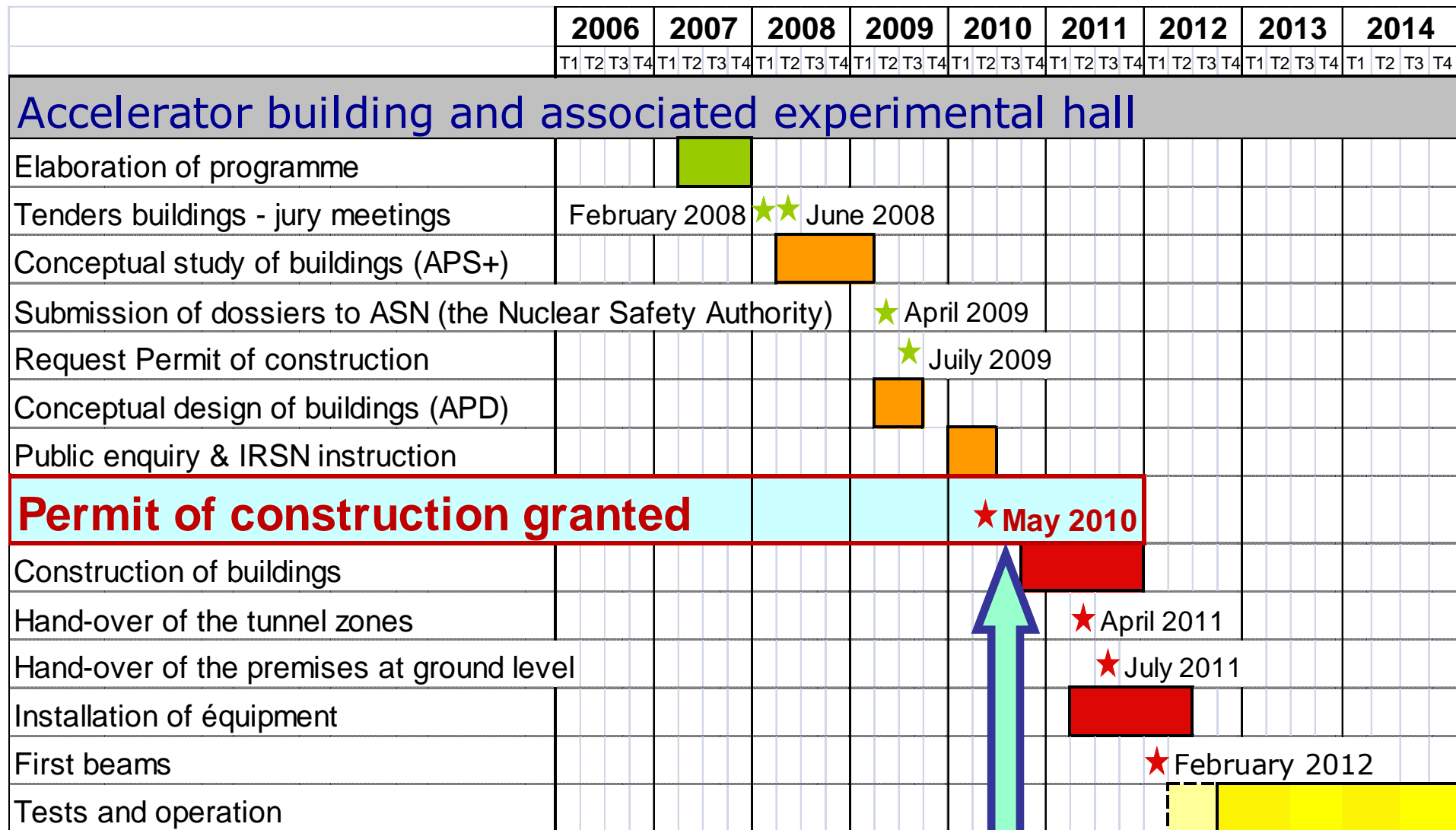


2007 2008 2009 2010 2011 2012 2013 2014 2015 2016





SPIRAL2 Phase 1 timeline



On the critical path



Infrastructures Phase 1

Accelerator & associated experimental hall (AEL)

Phase One Construction

Underground level: - 9.50 m

Injector area (Q/A 1/3)

Free room for Q/A 1/6

Superconducting
LINAC

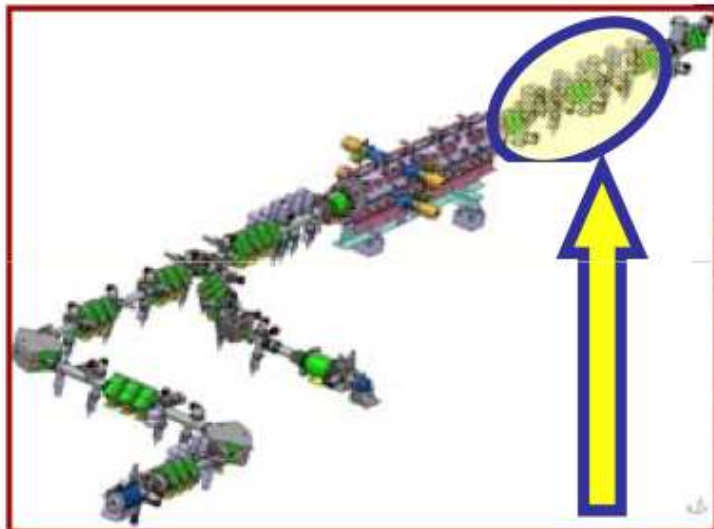
Neutrons for Science
Area (NFS)
& Multipurpose
Research Area (SRI)

Reserved space for
+ Exp Area / + LINAC

S3 Exp hall

Beam to the
PRODUCTION target

133 m

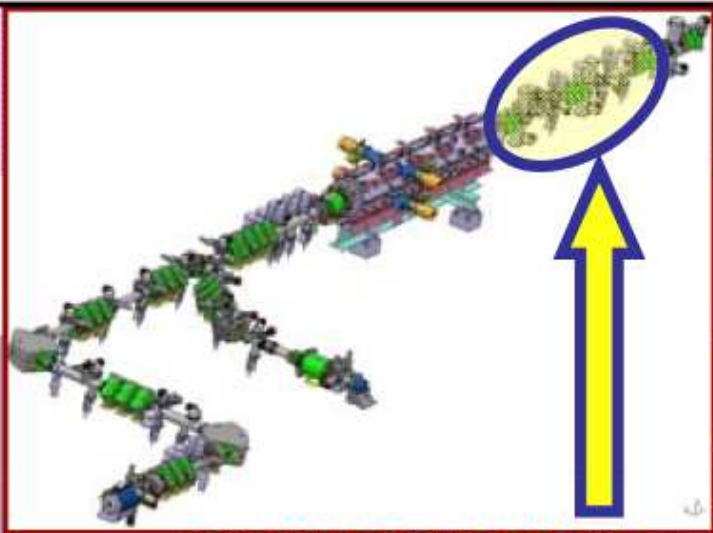


IPN Orsay
Cavities Type B

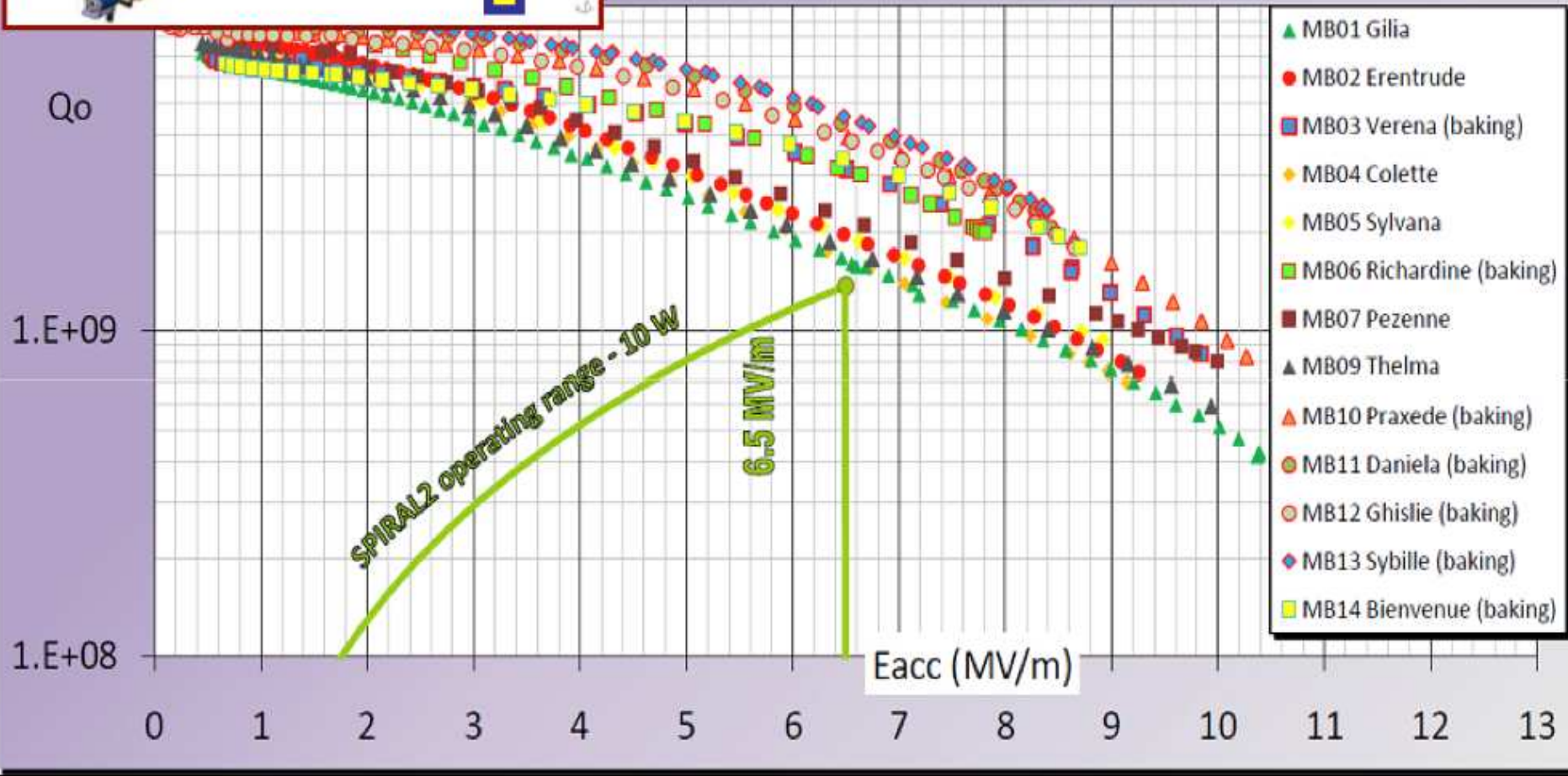
Status:
All cavities delivered and tested:
1st Cryomodule delivered in December

Accelerator

IPN Orsay Cavities type B



QWR beta 0.12
Vertical test results - T=4.2





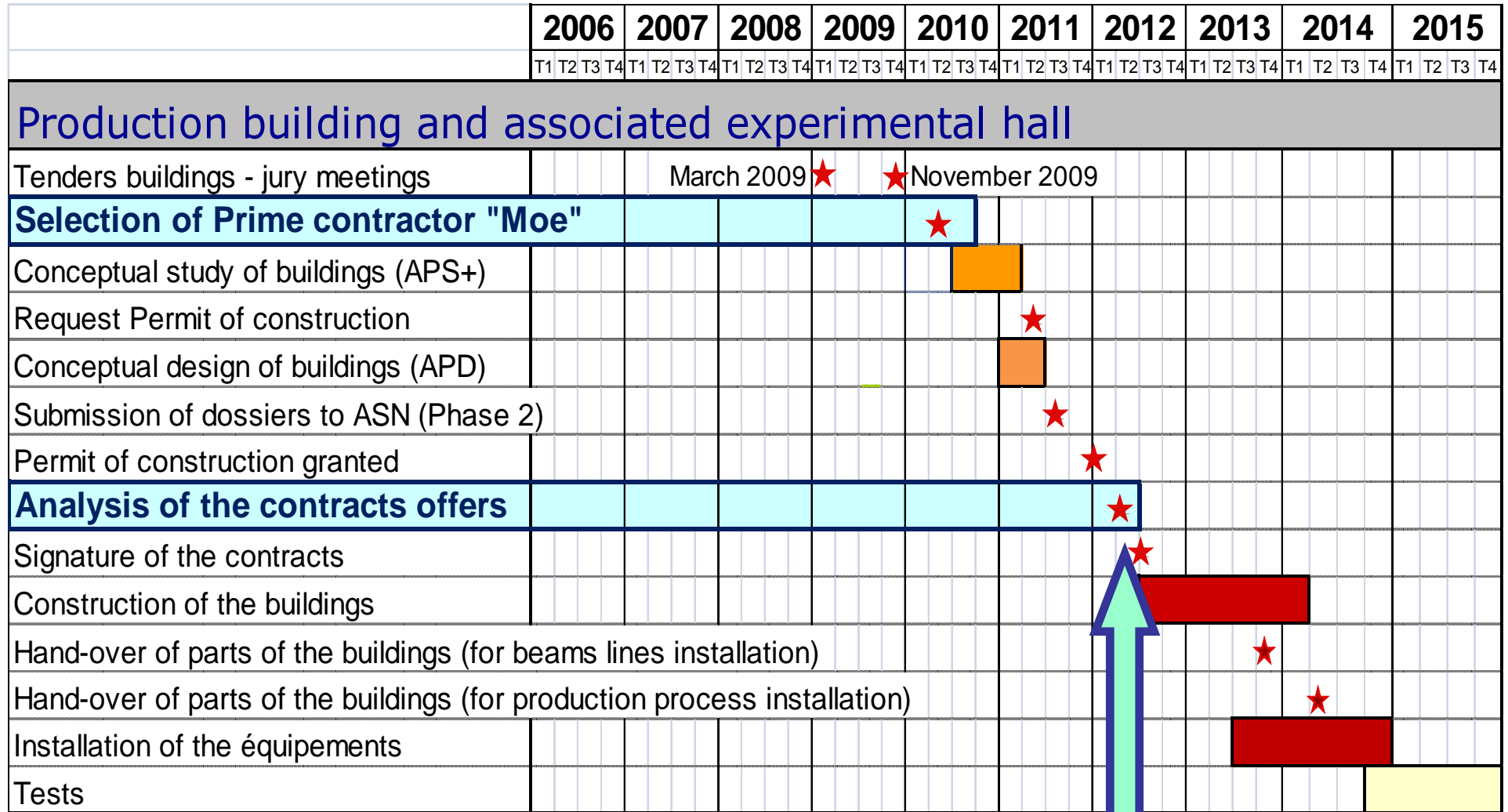
SPIRAL2 Buildings



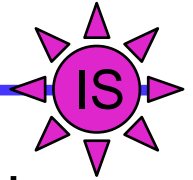
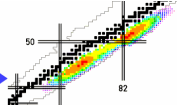
More in the talk of
J.C. Thomas



SPIRAL2 Phase 2 timeline

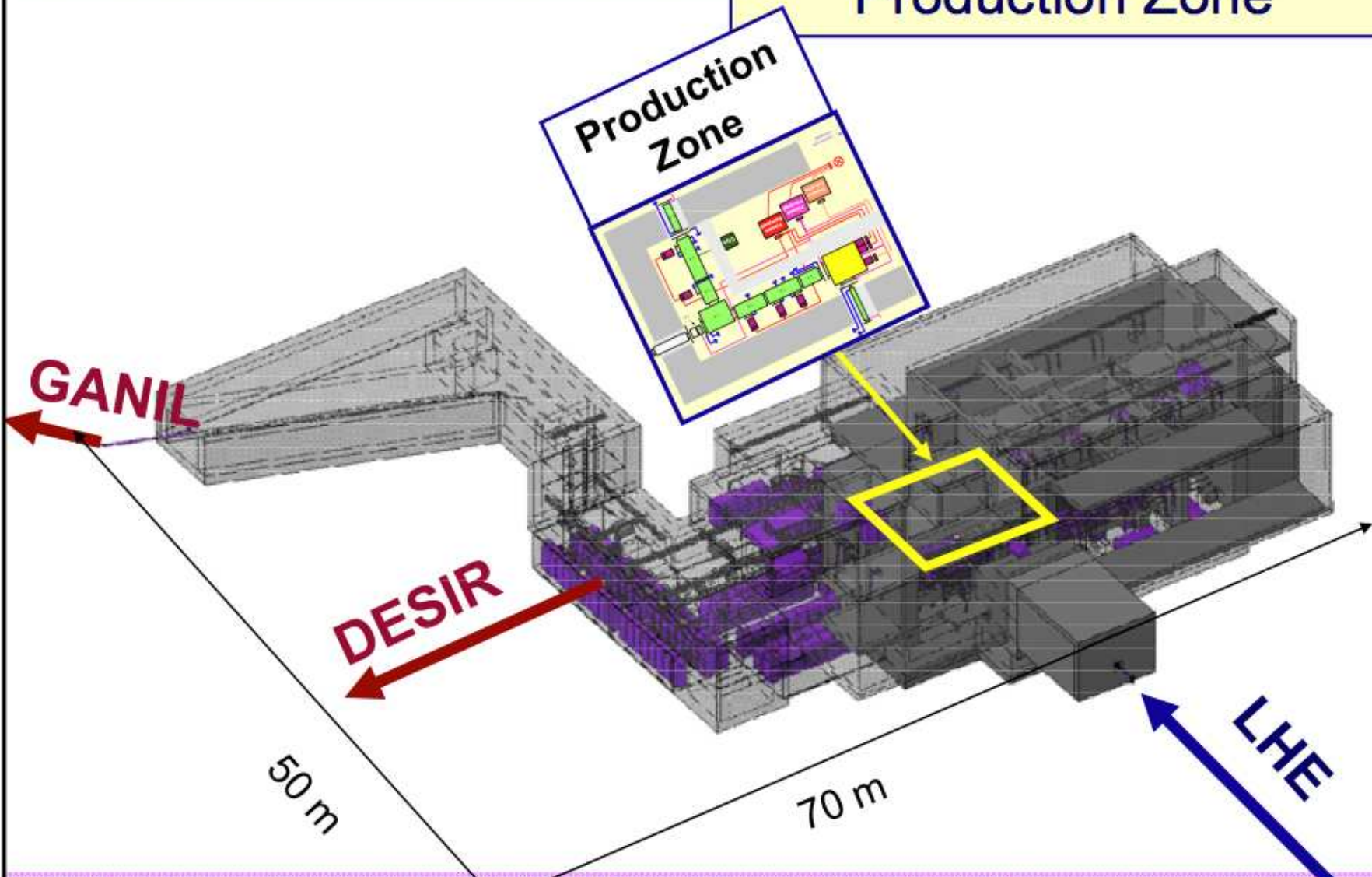


Decision on DESIR building



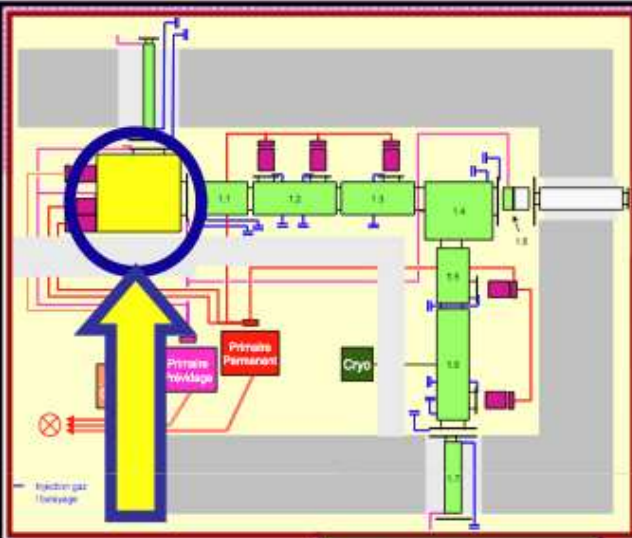
- Full technical design of the DESIR building and associated tunnels will be done by **middle of 2011**
- Decision on the construction of DESIR to be taken by **spring 2012** once the precise cost estimate is available
- 4 scenarios seem to be possible today:
 - Construction of full DESIR facility
 - Construction of 3 tunnels (from S3, RIB production building and SPIRAL1) during the SPIRAL2 Phase 2 and smaller DESIR building (DESIR Phase 1)
 - Construction of 3 tunnels (from S3, RIB production building and SPIRAL1) during the SPIRAL2 Phase 2 and construction of DESIR building later
 - No construction budget available for DESIR in the SPIRAL2 Phase 2

Radioactive Beams Production Zone



Radioactive Beams Production Module

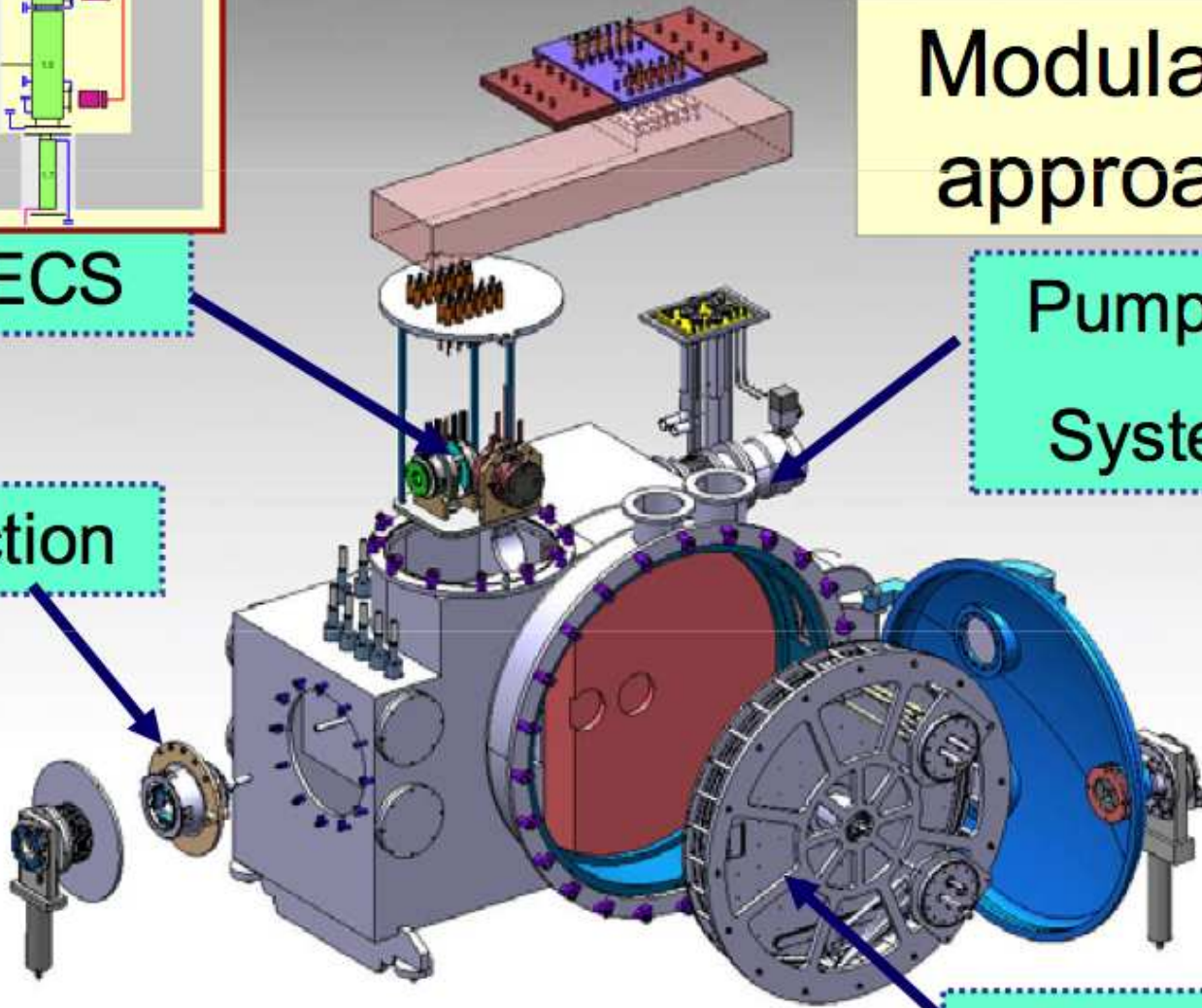
Modularity
approach



ECS

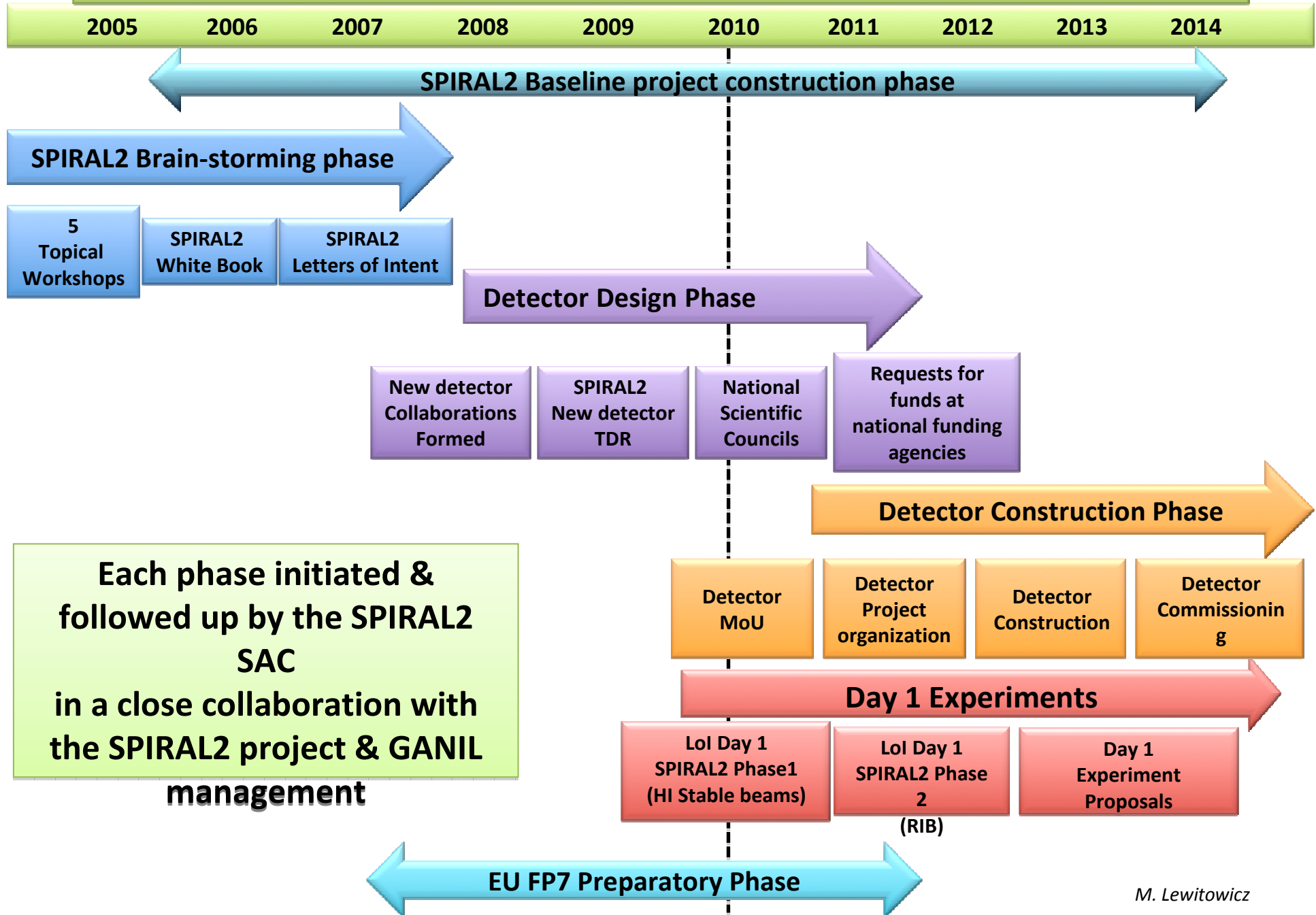
Pumping
System

Extraction

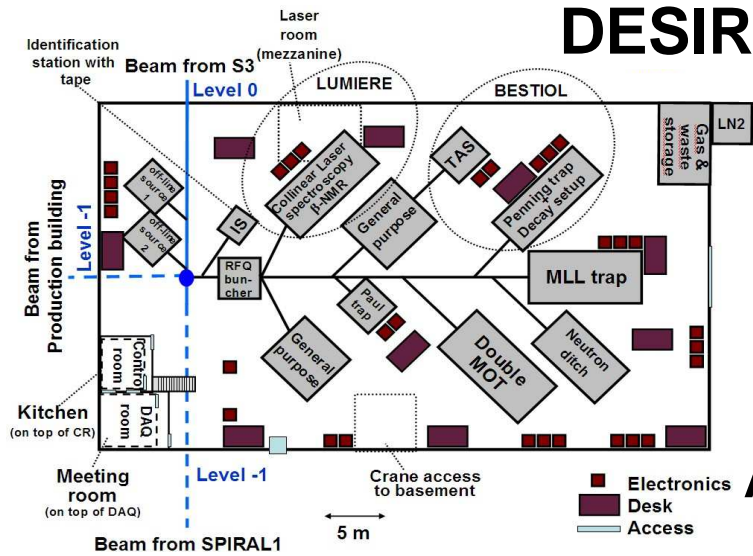


Converter

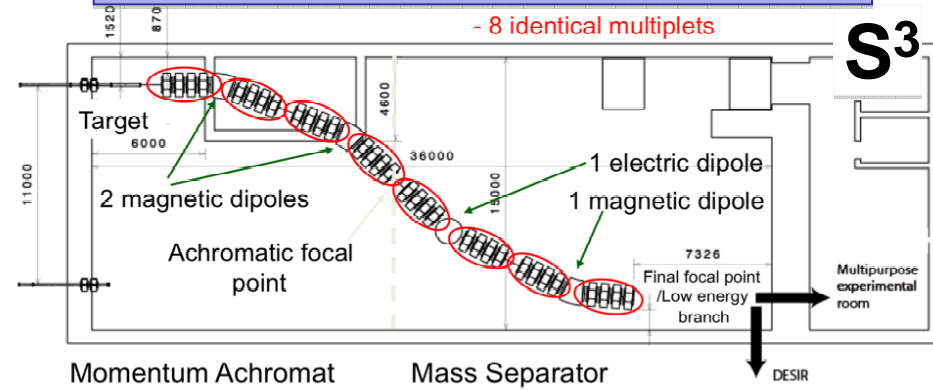
From physics idea to the SPIRAL2 experiments and instruments



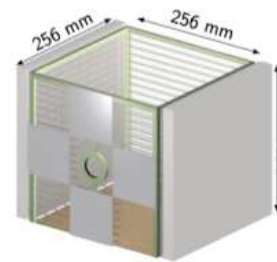
New detectors to be used at SPIRAL 2



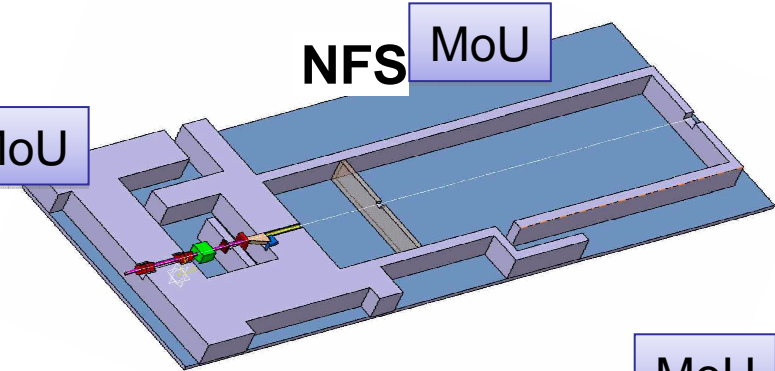
Steering Committee formed -> MoU



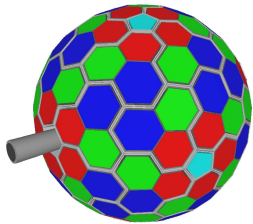
ACTAR & GET



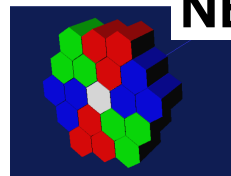
NFS



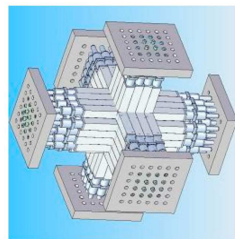
AGATA



NEDA



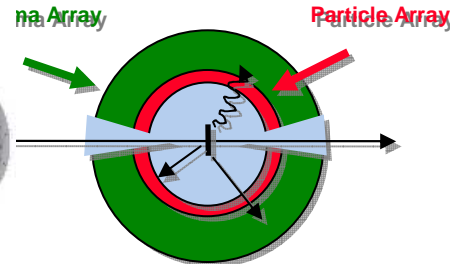
PARIS



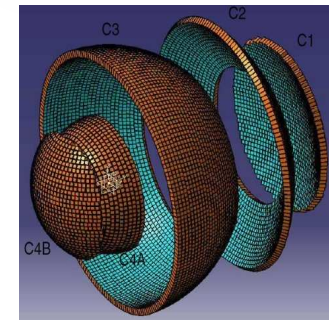
HELIOS



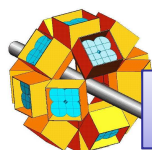
GASPARD



FAZIA

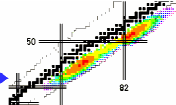


EXO GAM 2



MoU

Spiral2



FP7 SPIRAL2 Preparatory Phase



25 Partners - 13 Countries - 1 Coordinator

GANIL
GRAND ACCELERATEUR NATIONAL D'IONS LOURDES
LABORATOIRE COMMUN DE RESEAUX - INCORPORÉS



- >0.7M€ for SPIRAL2 baseline project
- 1M€ for SPIRAL2 Detectors

➤ Recently:

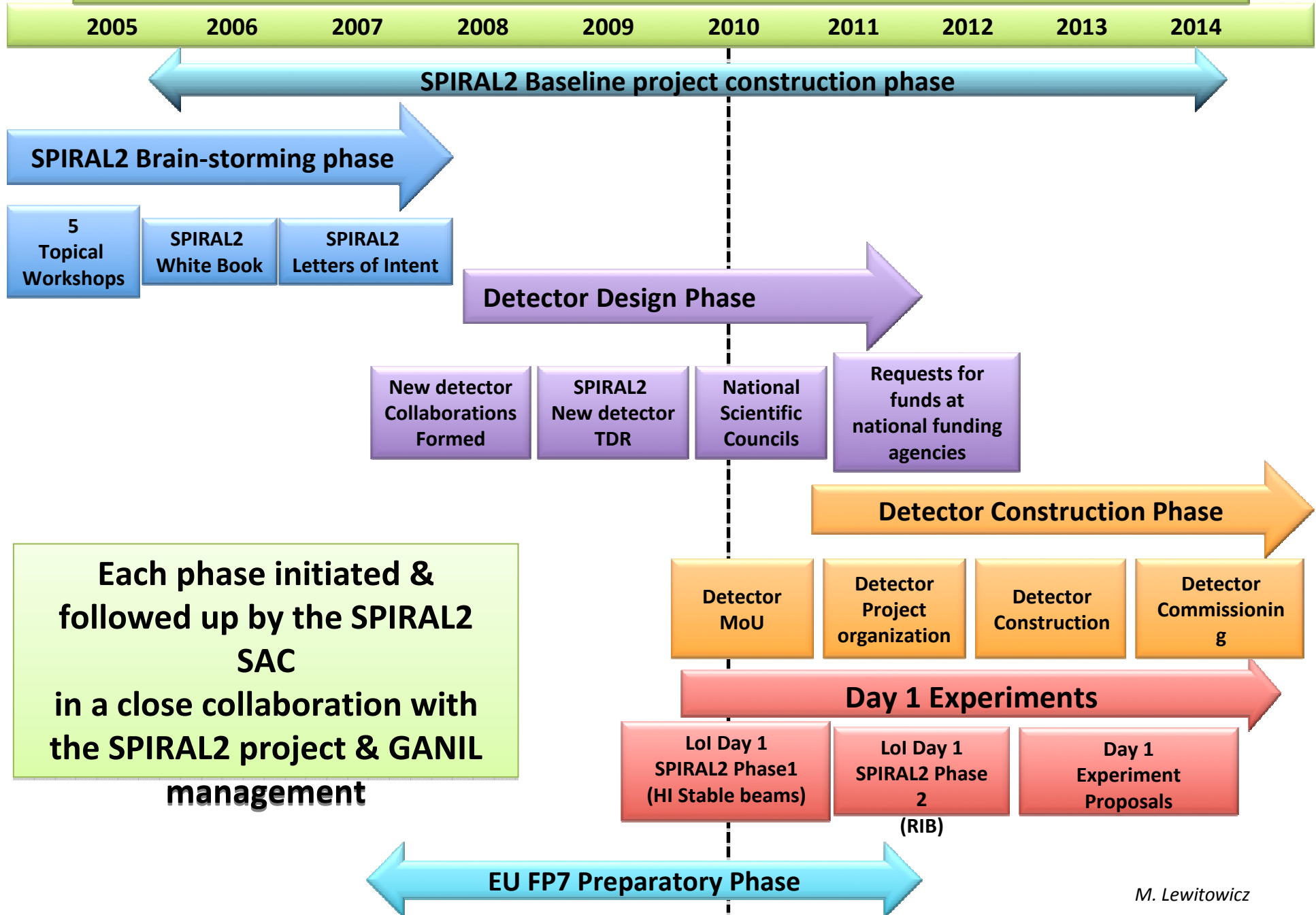
- Additional budget of 0,2M€ for the construction of SPIRAL2
- ACTAR included in the SPIRAL2PP
- Extension of the SPIRAL2PP project by 12 months requested -> end by October 31, 2011

ESFRI process and EU FP7 SPIRAL 2 Preparatory Phase contract (EC grant: 3,9 M€, 2008-2011, 25 partners) aims in the organisation and signature of the International Consortium for the construction of SPIRAL2 and the associated detectors -> **future intern. status of GANIL**

MoU on DESIR to be signed by October 2011

<http://www.spiral2pp.eu>

From physics idea to the SPIRAL2 experiments and instruments





Day 1 SPIRAL2 Phase 1 Experiments

- ✓ Call for Letters of Intent for Day 1 SPIRAL2 Phase 1 Experiments (with S3 and NFS) in May 2009
 - ✓ NFS & S3 Workshops in May/June 2009
 - ✓ Dead-line for Lol July 20th, 2009
 - ✓ Evaluation of the Lol at the SAC meeting on September 11th, 2009 at Colloque GANIL in Giens
- ✓ **Definition of the first beams and detectors necessary for Day 1 experiments by the SPIRAL2 Project**
- ⇒ Evaluation of the updated and new Lols by SAC: June 24 & 25th, 2010



Day 1 SPIRAL2 Phase 2 Letters of Intent

- ✓ Preliminary SAC request for the most requested Day 1 SPIRAL2 RIB (isotope, intensity, energy) sent to the users by March 3rd, 2010 (dead-line **March 31st, 2010**)
- ⇒ List of the RIB proposed by SPIRAL2 and an approximate date of the first experiments (validated by SPIRAL2 Project and Director of GANIL) by **beginning of June 2010**

More in the talk of P. Delahaye
- Call for Letters of Intent for Day 1 SPIRAL2 Phase 2 Experiments (with RIB) in the **beginning of June 2010** by SAC
- Collaboration Workshops June – November 2010
- Dead-line for Lols: **middle of December 2010**
- Evaluation of the Lol at the SAC meeting **January 26-28, 2011** (SPIRAL2 Week 2011)
- Analysis of the SAC recommendations and technical/safety constraints by SPIRAL2 -> final decision on the first TIS(s) by **February 2011**



Day 1 SPIRAL2 Phase2 Requested RI Beams

RIB requested for SPIRAL2 Day 1 Phase 2 experiments

	Light RIB Z<20	20<Z<70 RIB (Fission-Fragments)	Heavy RIB Z>70	Total	n-rich	p-rich	Number of requests (e-mails)
Fast RIB (CIME)	28	181	1	210	82%	18%	19
DESIR RIB	20	100	22	142	87%	13%	9
			Total	352			28

The most requested: ^{94}Kr , ^{132}Sn , $^{140,142}\text{Xe}$, ^{78}Ni

- Users expect from the SPIRAL2 a very large variety of RIB (thus produced with many different targets and ion-sources) already in the beginning of the operation of the facility
- UCx production target should be considered already in the beginning of the operation of the facility
- 40% of all requested RIB are beams at low energies to be used at the DESIR facility.



SPIRAL2 SAC meeting on January 28-29, 2010

Main Topics (*presented by*):

- Theory for SPIRAL 2 - *M. Ploszajczak*
Preceded by two introductory talks on theory
 - **From few to many nucleons; a tale on recent advances (and challenges) in nuclear many-body theory** by M. Hjorth-Jensen – Univ. of Oslo/MSU
 - **New ideas and new results in the nuclear energy density functional approach** by J. Dobaczewski – Univ. of Warsaw and Univ. of Jyväskylä
- HELIOS project for SPIRAL2 - *B. Back*
- NEDA neutron detector - *J.J. Valiente Dobon*
- ACTAR - *P. Roussel-Chomaz*
- DESIR - *D. Lunney*
- EXOGAM2 - *G. de France*
- FAZIA - *G. Poggi*
- S3 - *J. Nolan*
- PARIS – Status Report



SPIRAL2 SAC meeting on January 28-29, 2010

The **DESIR facility** status report:

The SAC is impressed by the high-level, experienced expert group involved in the design of the HRS and finds the proposed **“alpha”-shape solution very attractive**. The **work on SHIRaC is equally impressive**, (...).

There was no new information on the experimental stations (...) the research programme previously presented is excellent; **the technical configuration (HRS, SHIRaC, etc.) now proposed is very convincing** and the SAC expects that it is consolidated in further studies.

It appears prudent that at this point the DESIR facility, proposed for phase 2 of the SPIRAL2 project, be made part of the official project and as such supported by the French agencies. **The DESIR collaboration has the potential to be the carrier of a broad and scientifically strong international involvement** in the research programme at SPIRAL2.



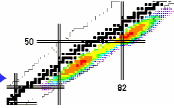
Next SPIRAL2 SAC meeting on June 24-25, 2010

- Evaluation of the updated and new Lols for experiments with Day 1 SPIRAL2 Phase 1 (with NFS and S3)
- Theory for SPIRAL2 (follow-up)
- In parallel to the SAC closed session:
 - SPIRAL2 Theory – Experiment meeting (Coordinator H. Goutte)

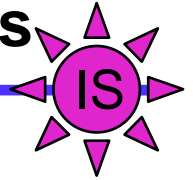
Goals:

- Share with all theoreticians future experimental projects (Lols, detectors),
- Identification of the theory group(s) interested by the joint work with experimentalists for each (if possible) Lol,
- Compare predictions of different theoretical approaches,
- Identify the necessary improvements and new theoretical developments,
- Identification of actions dedicated to improve resources available for theory groups (ANR, EU projects, dedicated requests to CNRS, CEA etc.)
- **To work out jointly the best proposals of future experiments.**

Spiral2



DESIR@SPIRAL2 2010-2012 Milestones



- DESIR Collaboration Workshop **May 26-28**
- Call for Letters of Intent for Day 1 SPIRAL2 Phase 2 Experiments (with RIB) in the **beginning of June 2010** by SAC
- Dead-line for Lols: **middle of December 2010**
- Tests of the prototype of RFQ cooler **before the end of 2010**
- Detailed design study of HRS **before the end of 2010**
- Evaluation of the Lol at the SAC meeting **January 26-28, 2011** (SPIRAL2 Week 2011)
- Detailed technical design of the DESIR building and associated tunnels by **middle of 2011**
- DESIR MoU to be signed by **October 2011** (deliverable of SPIRAL2 PP)
- Decision on the construction of DESIR building by **spring 2012**