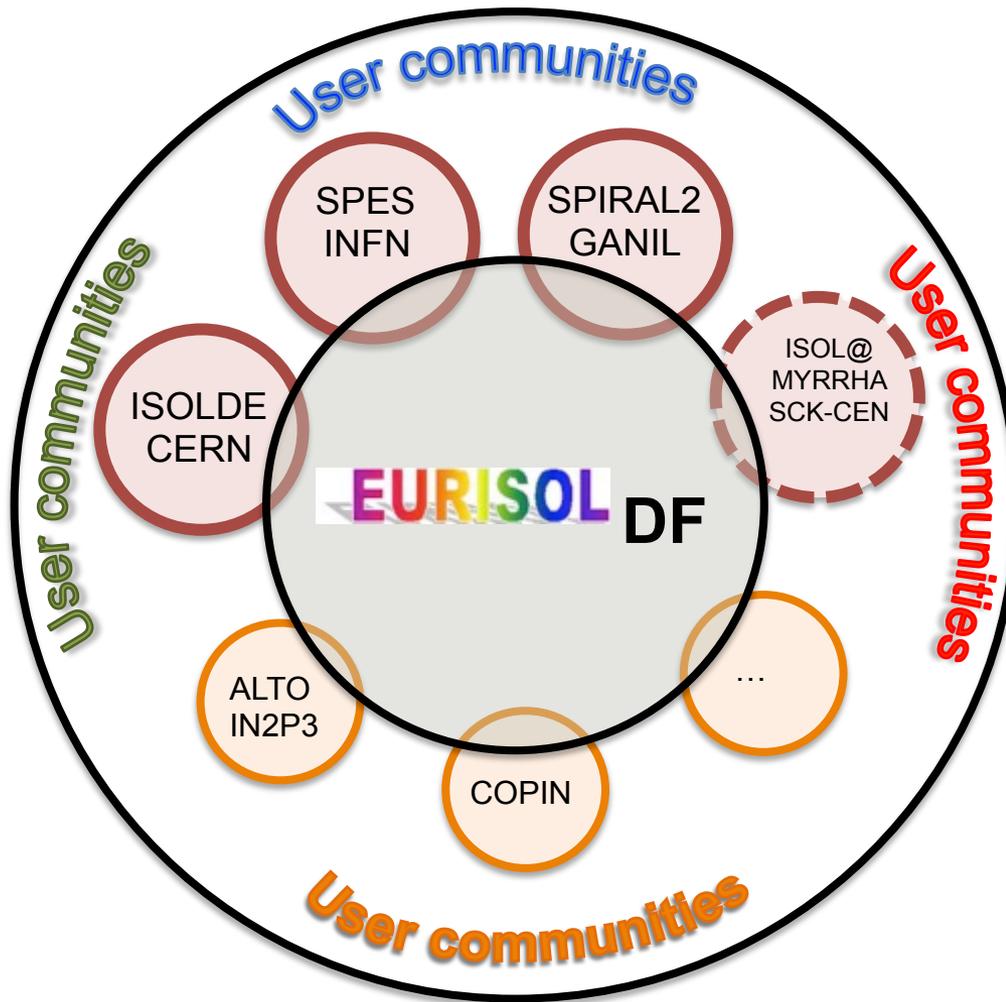
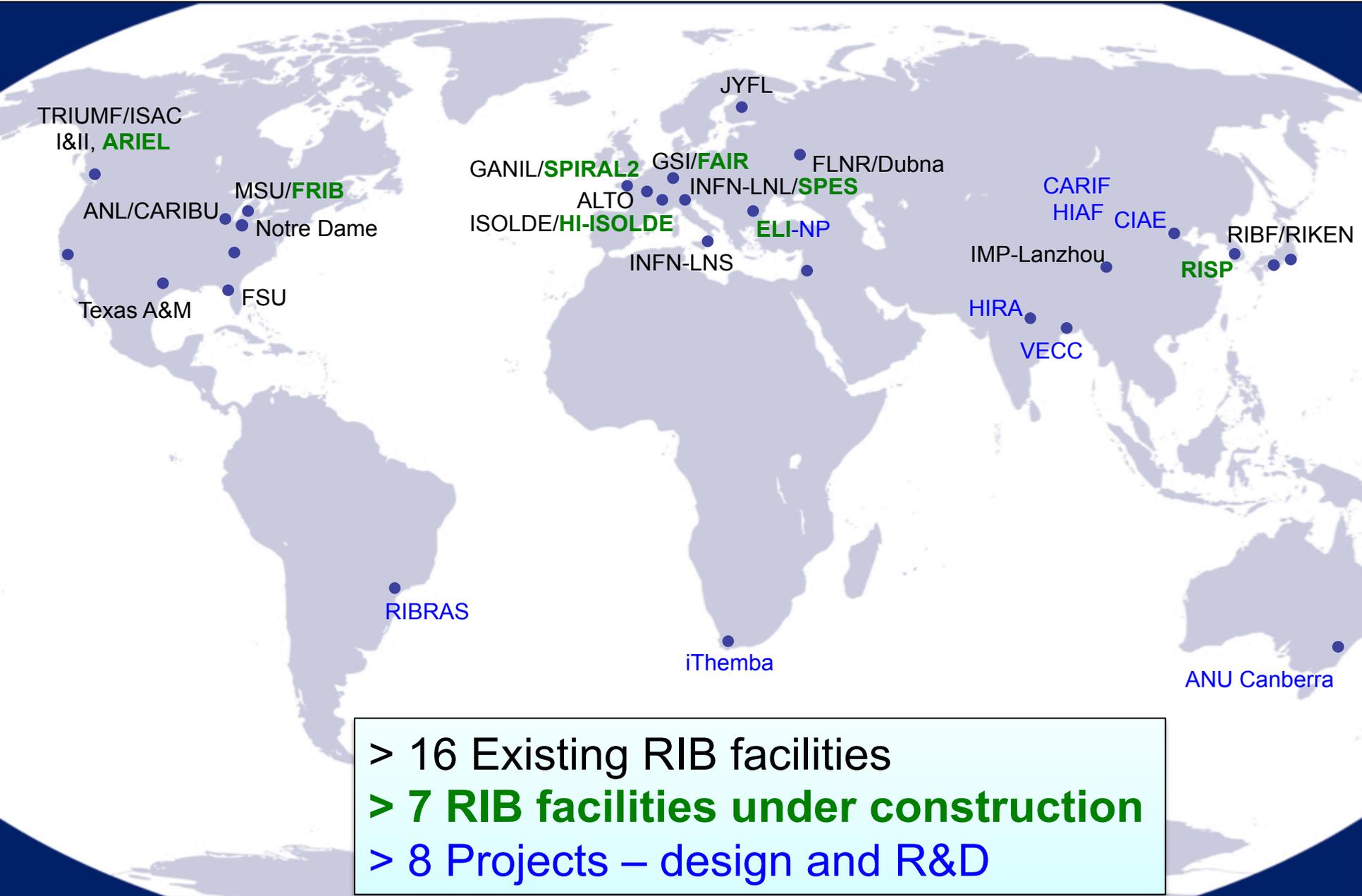


EURISOL – Distributed Facility (DF) Initiative



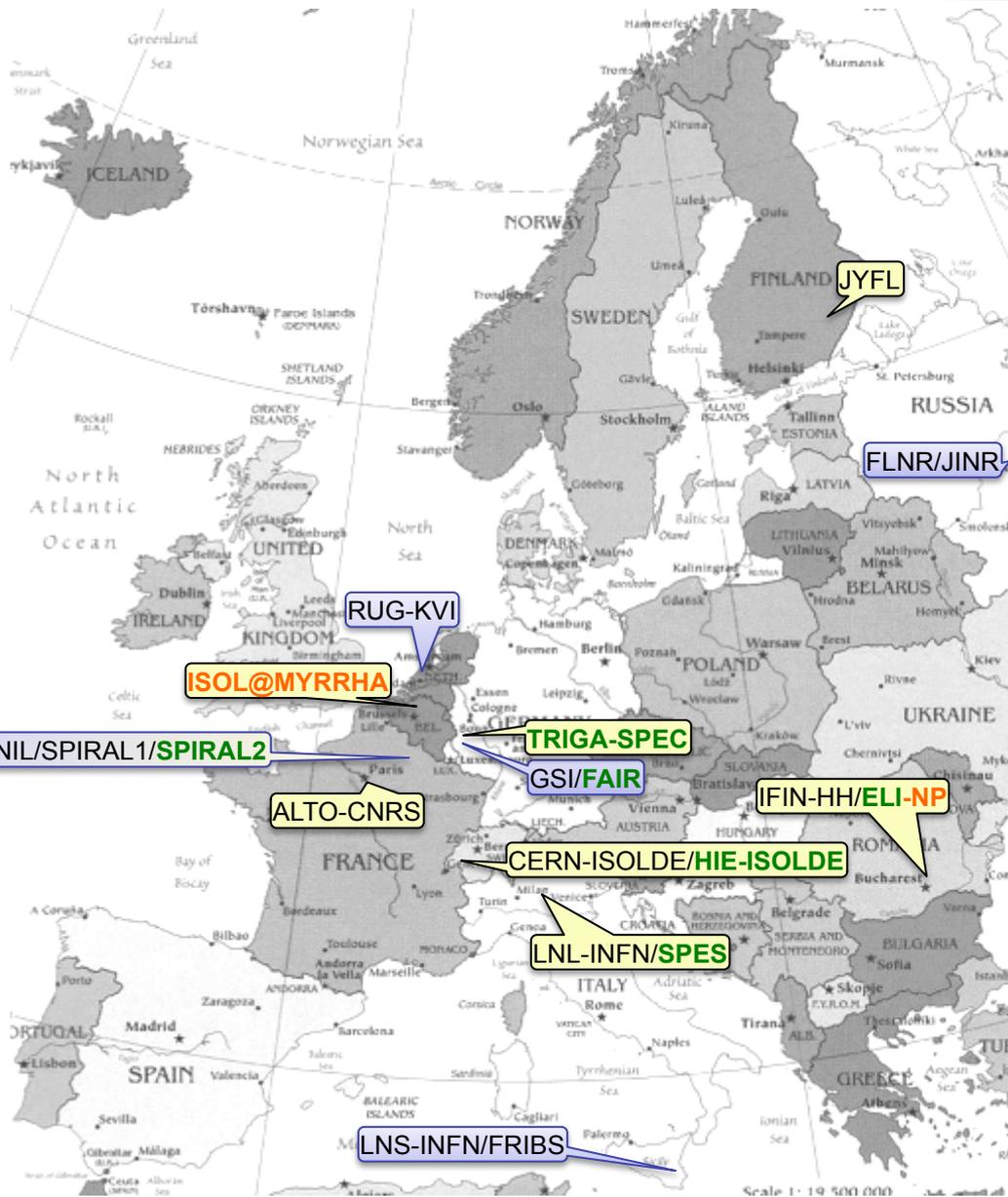
*M. Lewitowicz
for the EURISOL Steering Committee*

Rare Isotope Beam FACILITIES WORLDWIDE



- > 16 Existing RIB facilities
- > **7 RIB facilities under construction**
- > 8 Projects – design and R&D

Radioactive Ion Beam Facilities in Europe



9 Existing RIB Facilities:

5 In-flight fragmentation

4 ISOL

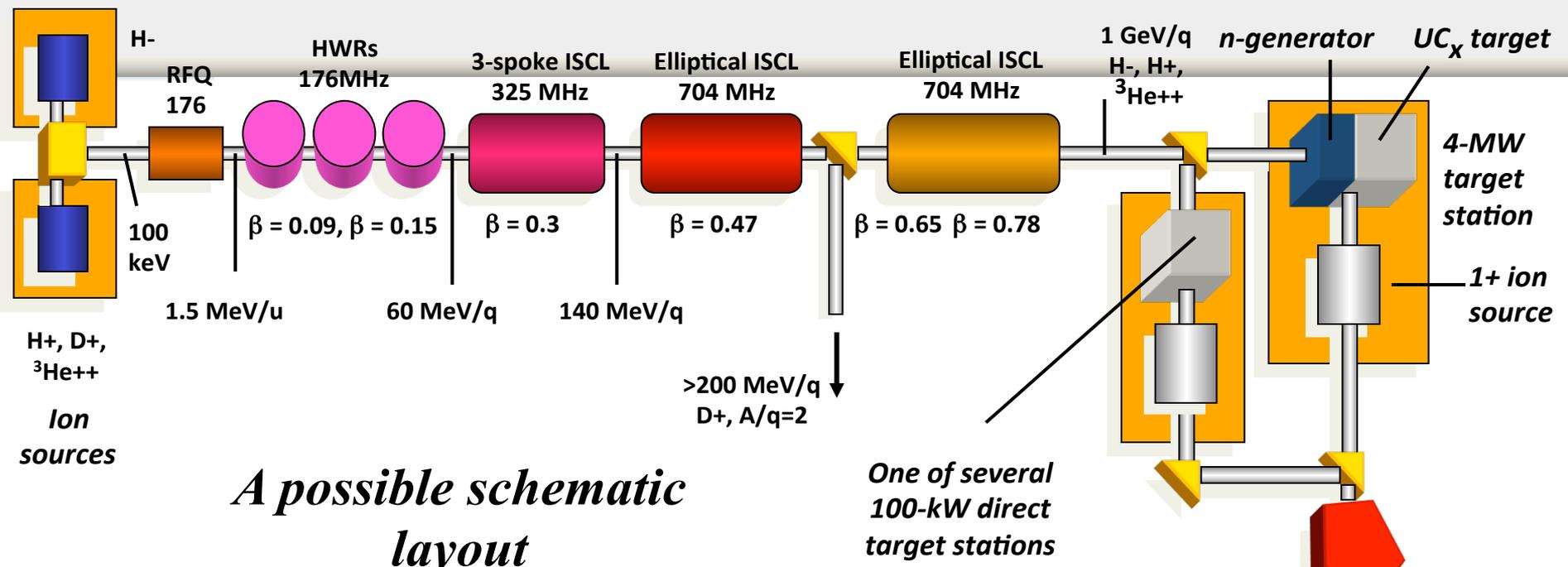
5 Facilities/upgrades under construction or commissioning

2 Projects under design

Community: 2700-3000 scientists and highly qualified engineers

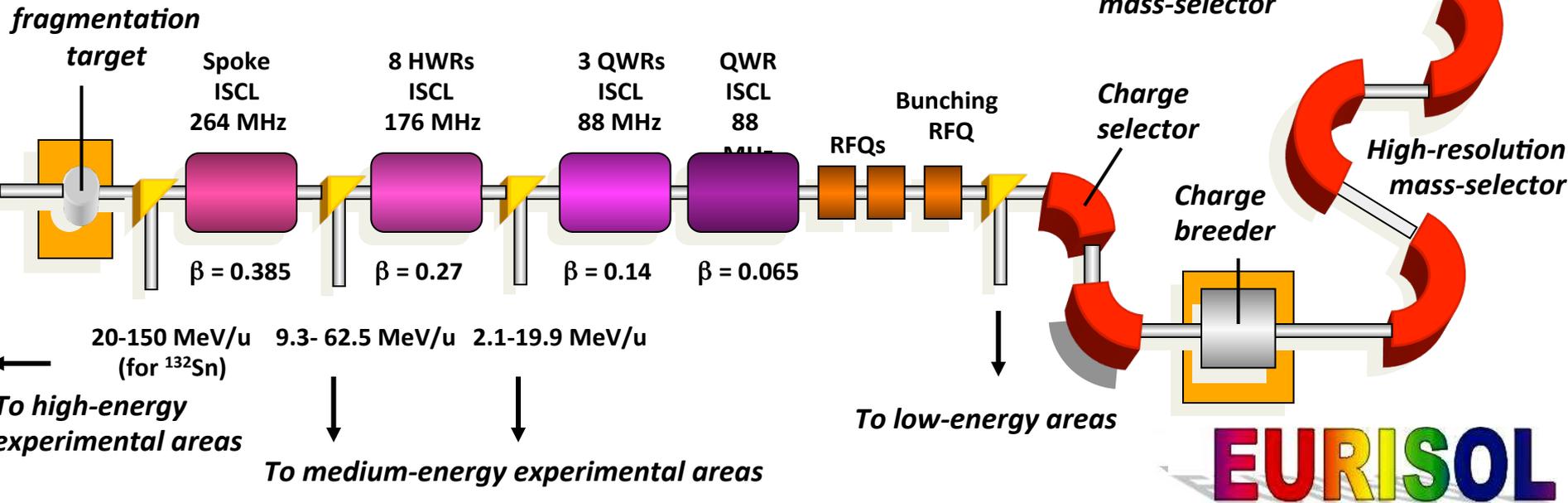
What is EURISOL?





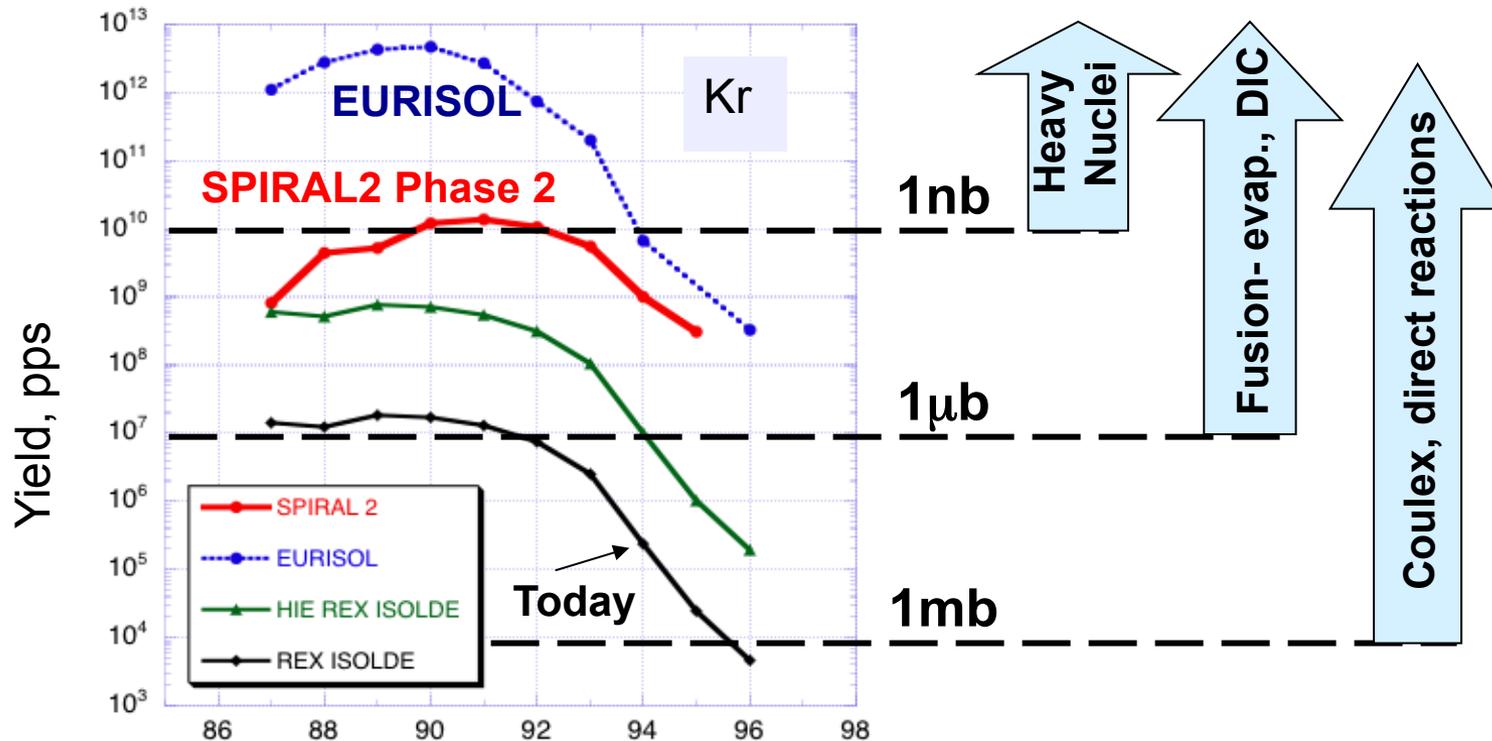
A possible schematic layout

Secondary fragmentation target for a EURISOL facility



EURISOL & EU ISOL facilities

Post-accelerated beam intensities

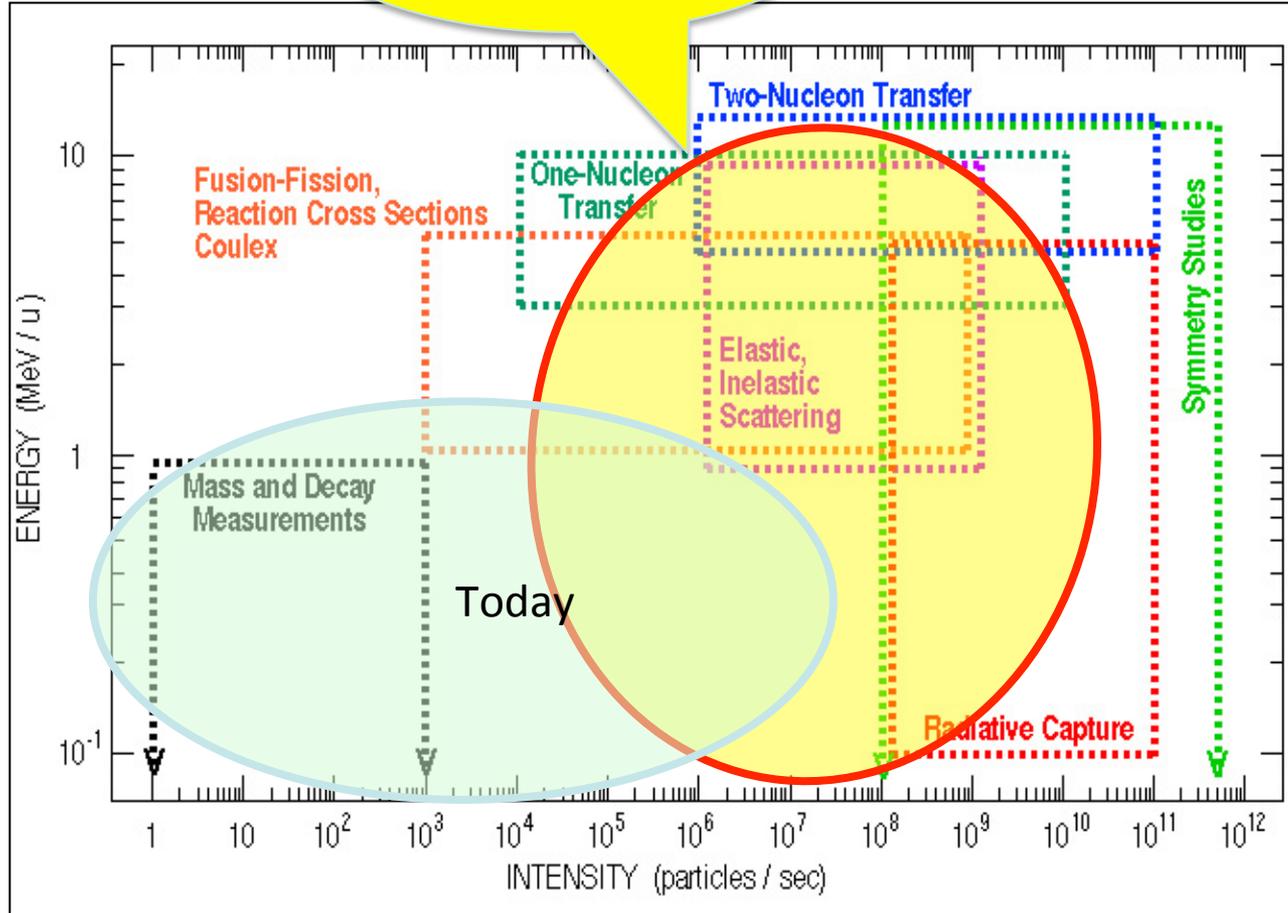


A

Ex.: At 1nb 1 nucl./day via fusion-evaporation

Physics with RIB Intensity domain

HI-ISOLDE, SPES,
SPIRAL2,
ISOL@MYRRHA
EURISOL



today

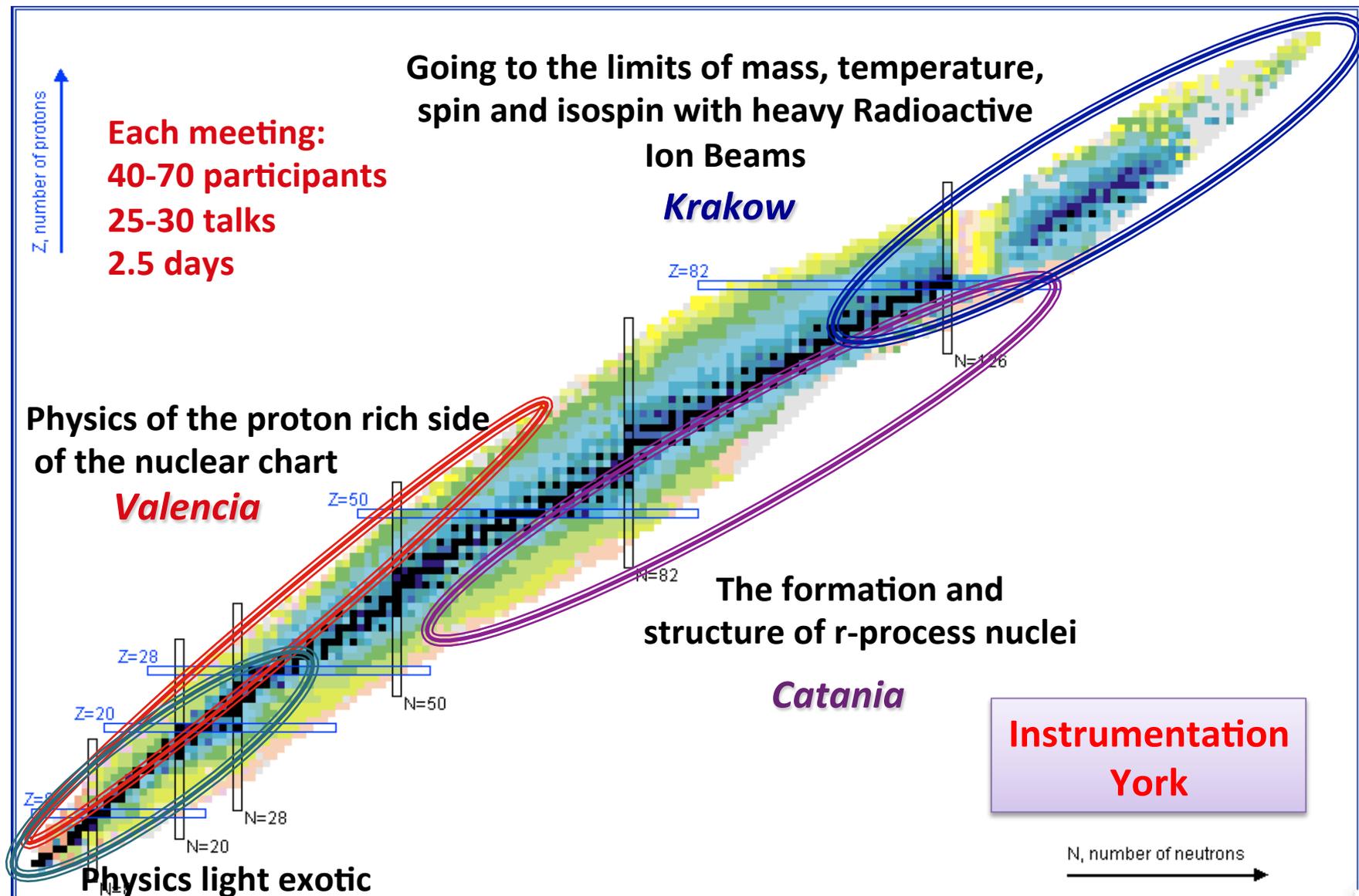


Background

- 2001-2005: EURISOL RTD
- 2005-2009: EURISOL Design Study (see <http://www.eurisol.org>)
- 2010: EURISOL endorsed by NuPECC as highest long term priority for low energy nuclear physics in Europe
- EURISOL Office
- **EURISOL User Group: Update of the physics case**
- **EURISOL related R&D Initiatives**
- Existing & planned ISOL facilities in Europe:
 - GANIL-SPIRAL2, HIE-ISOLDE, SPES, ISOL@MYRRHA, ALTO, JYFL

-> EURISOL MoU

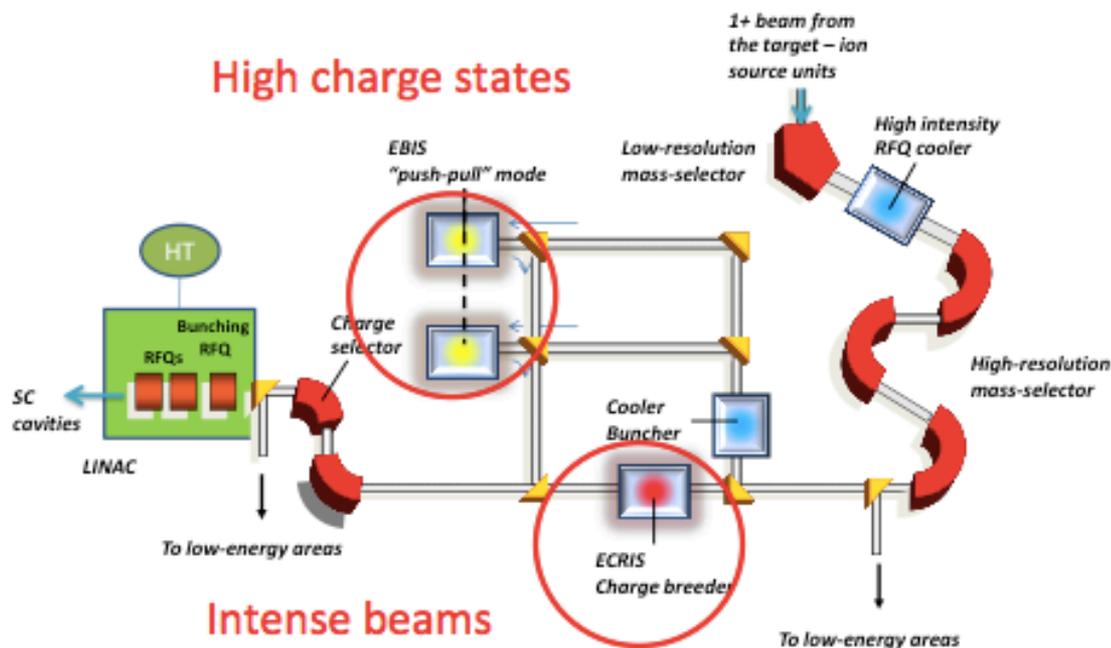
5 Topical Meetings (2009-2014)



EURISOL related R&D Initiatives

- **EMILIE: Charge Breeding**
- LIEBE: Pb-Bi target
- TIARA: Test Infrastructures
- EURISOL JRA in ENSAR2

« Enhanced Multi-Ionization of short Lived Isotopes for EURISOL » Charge breeding techniques for ISOL facilities

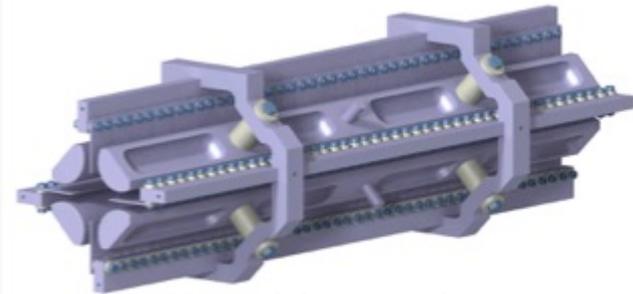


Consortium of 8 European laboratories



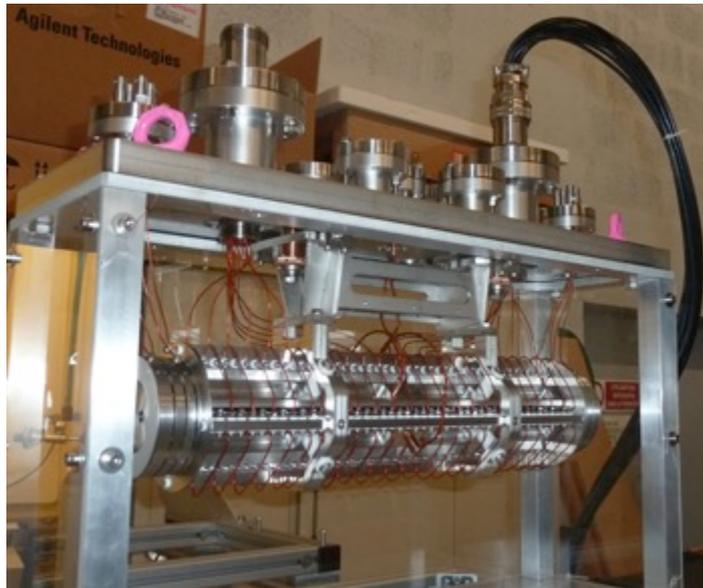
J. Angot, G. Ban, L. Celona, J. Choinski, , P. Delahaye (GANIL IN2P3, coord.), A. Galata (INFN, deputy coord.), P. Gmaj, A. Jakubowski, P. Jardin, T. Kalvas, H. Koivisto, V. Kolhinen, T. Lamy, D. Lunney, L. Maunoury, A. M. Porcellato, G. F. Prete, O. Steckiewicz, P. Sortais, T. Thuillier, O. Tarvainen, E. Traykov, F. Varenne, and F. Wenander

EBIS beam debuncher



Longitudinal Paul trap
for EBIS pulses
debunching

P. Delahaye et al, Rev. Sci. Instrum. **83** , 02A906 (2012)



Prototype simulated by Emil Traykov (GANIL)
Design and Construction Yvan Merrer/P. Desrues (LPC Caen)
RF DC electronics and wiring J. F. Cam (LPC Caen)

Tests using the SHIRAC test bench



Tests at LPC Caen with pulsed 1+ beams during the fall of 2014

EURISOL MoU

The EURISOL MoU establishes a common understanding among the Parties of the collaborative effort required for the continued development of EURISOL, including more focused R&D and a more refined cost estimate.

Signatories: CERN, COPIN (Poland), BEC (Belgium), GANIL, INFN

The MOU is implemented by a Steering Committee with one representative per signatory. The members are:

MJG Borge (CERN), M. Lewitowicz (GANIL, chair), A. Maj (COPIN), S. Pirrone (INFN), L. Popescu (BEC) and A. Bracco (NuPECC representative)

-> EURISOL-DF Initiative

EURISOL – Distributed Facility (DF)



Members Initially:
HIE-ISOLDE/CERN
SPES-INFN
SPIRAL2-GANIL

Candidate - future facility:
ISOL@MYRRHA

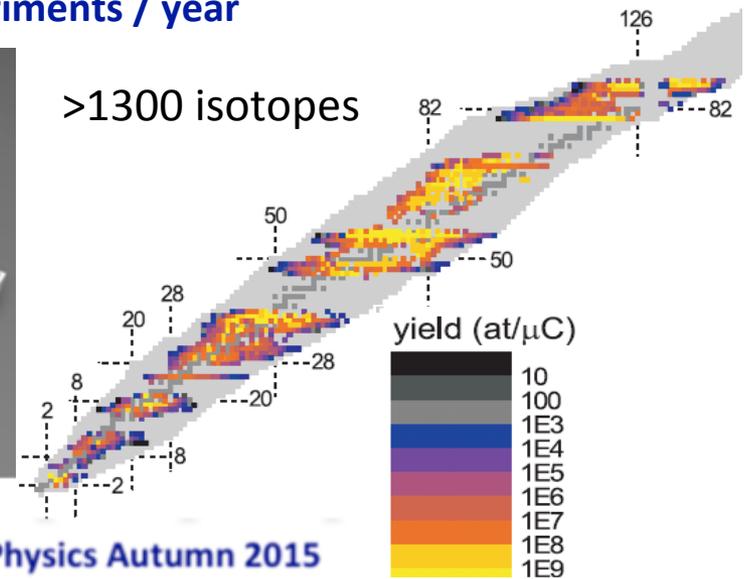
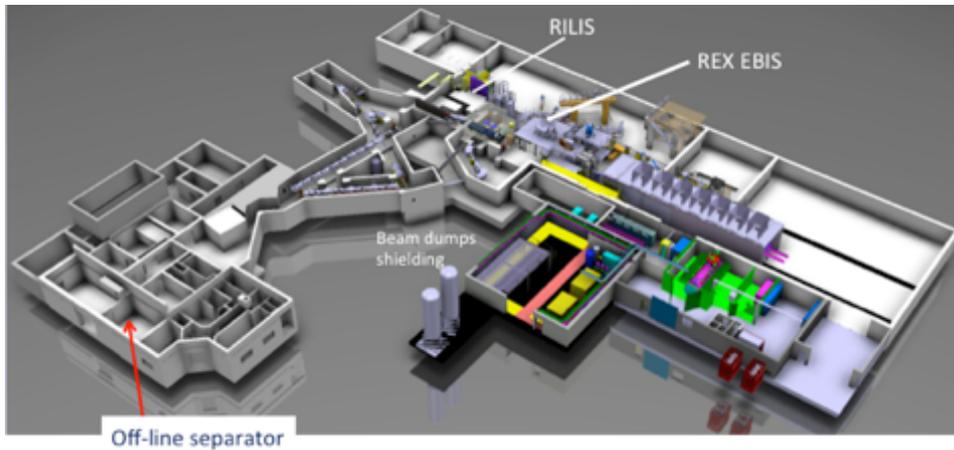
EURISOL MoU member:
COPIN Consortium Poland

Smaller scale ISOL facilities:
ALTO, JYFL?

Project to be submitted for
the 2018 update of the
ESFRI roadmap

HIE-ISOLDE Facility

- ISOLDE is the CERN radioactive beam facility (approved 50 y ago!)
- Provides low energy or post-accelerated beams
- Run by an **international collaboration since 1965. Presently 13 members** (B, CERN, Dk, E, F, Ge, Gr, I, India, N, R, S, UK)
- **> 500 Users from 100 Institutions, 50 experiments / year**



✓ HIE STAGE 1



Physics Autumn 2015

@ 4.3 MeV/u

Spring 2016 5.5 MeV/A

✓ HIE STAGE 2



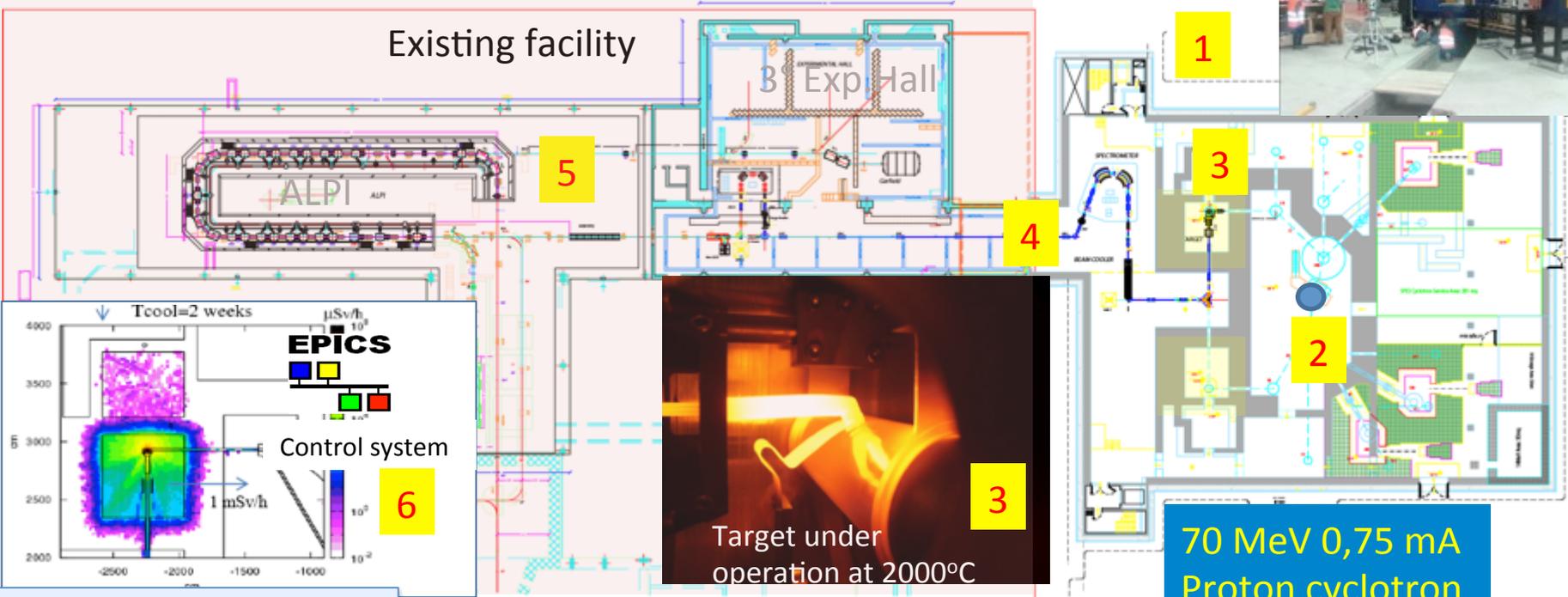
2017
10 MeV/A

Started Jan 2010
Budget 35 M€

✓ HIE STAGE 3 WITH CHOPPER LINE 2018 (LS2)



SPES Facility at LNL Legnaro

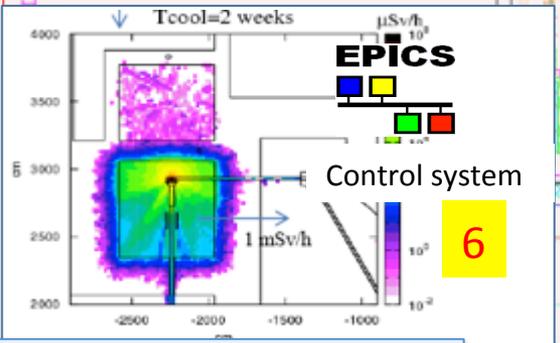
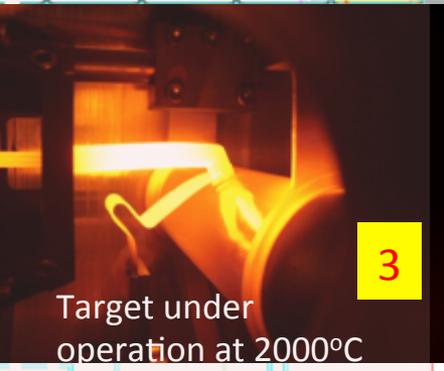


≥ 50 M€,
first beams by 2019



SPES sub-systems	
1	Building and infrastructures with 2 ISOL bunkers for radioactive beam and application area for radioisotopes and neutrons
2	Cyclotron 70 MeV protons with 2 independent exits
3	ISOL UCx target designed for 10^{13} f/s - direct production with p
4	Beam transport with High Resolution Mass Separation
5	Reacceleration with ALPI superconductive linac (10A MeV A=130)
6	Radioprotection, safety & controls

70 MeV 0,75 mA
Proton cyclotron

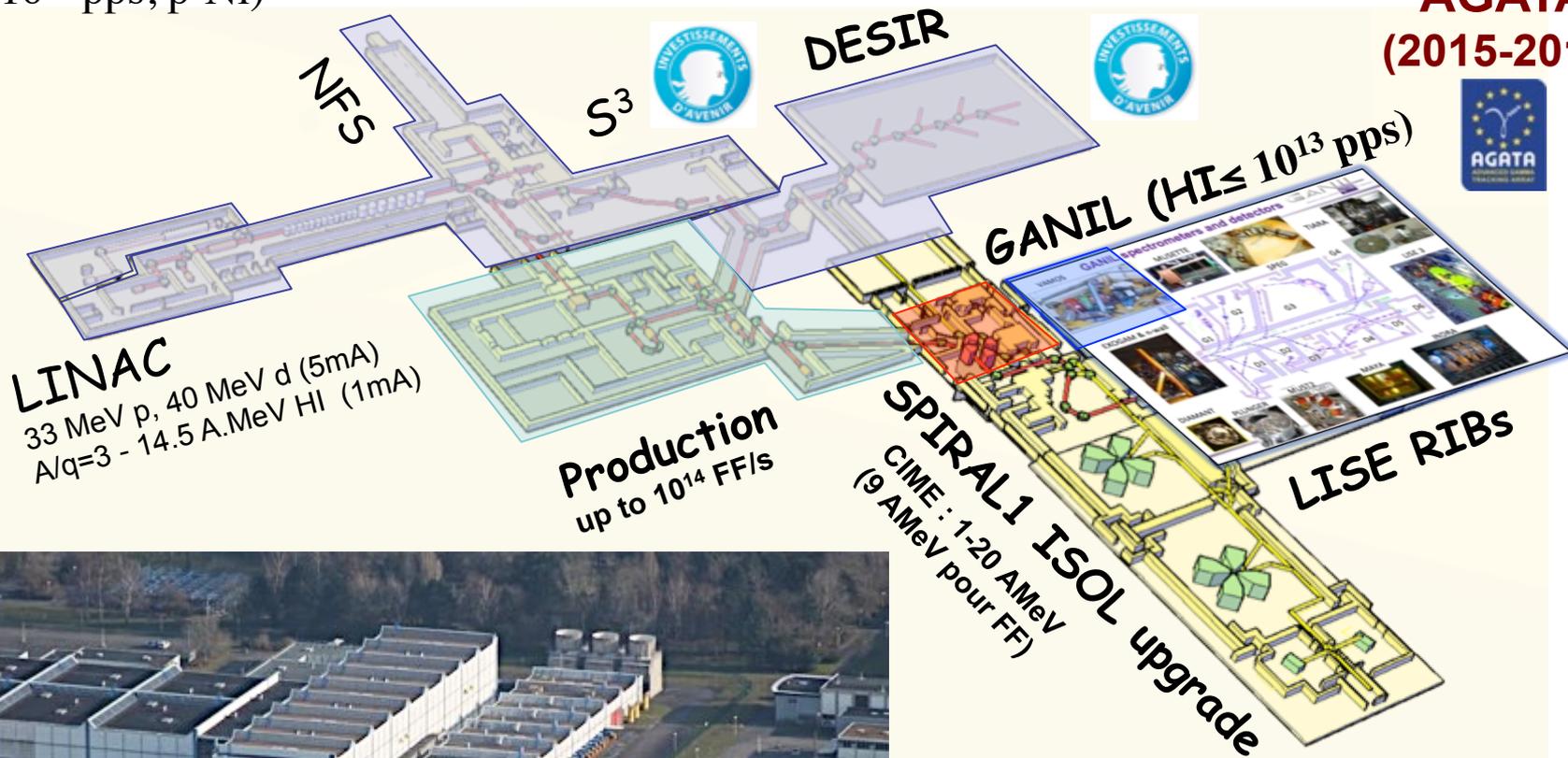


Phase1 (2016-)

Increase the intensity of stable beams
 High intense neutron source
 ($HI \leq 10^{15}$ pps, p-Ni)

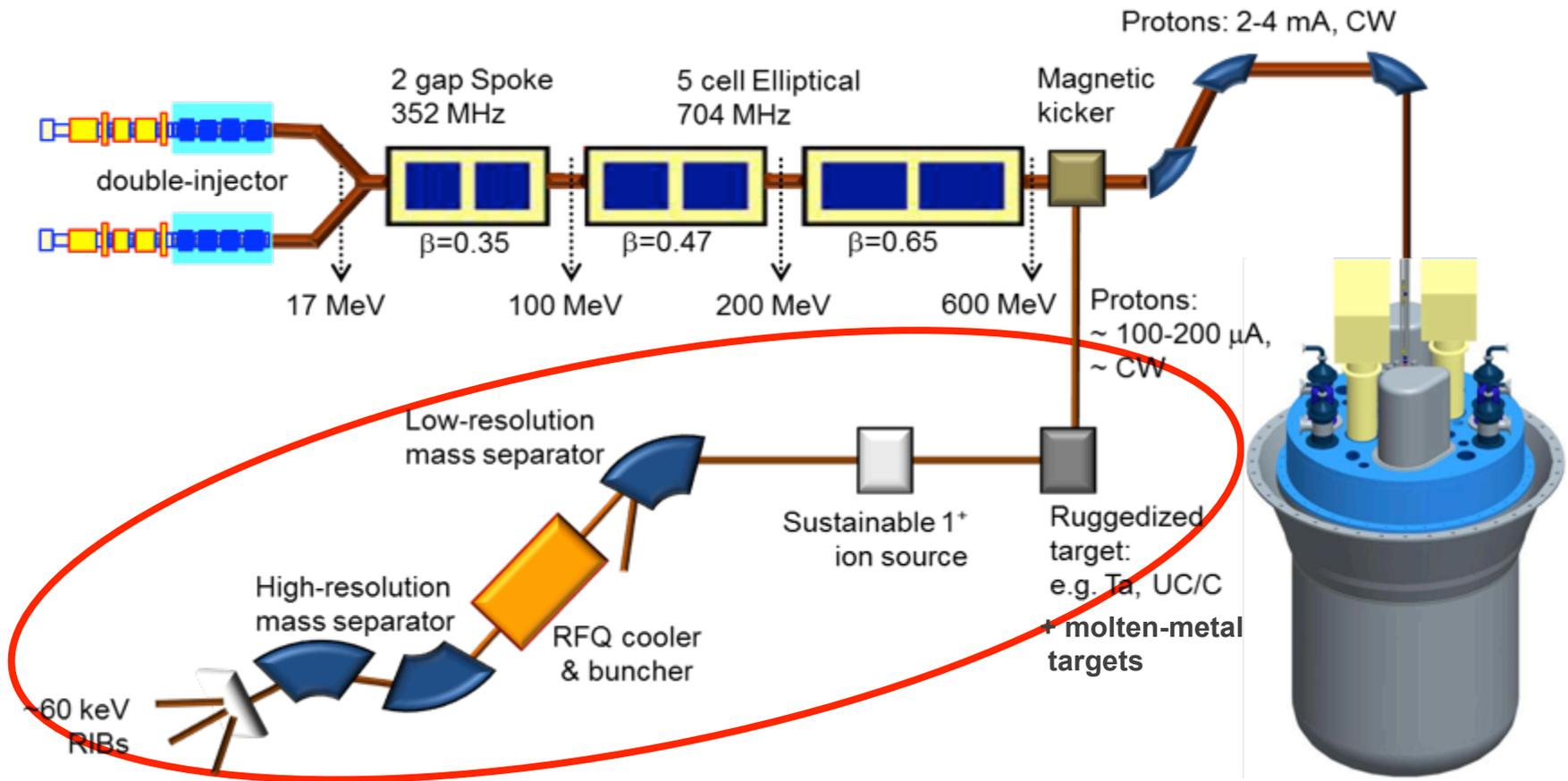
DESIR Phase1+ (2020-)
 Low energy facility

AGATA
 (2015-2018)



SPIRAL1 Upgrade (2017-)
 New light RIBs from
 beam/target fragmentation

ISOL@MYRRHA - Concept



- Driver-beam power on ISOL@MYRRHA target: 60-120 kW
- Low-energy RIBs
- Experimental programme complementary to other ISOL facilities – long-run experiments

Goals of the EURISOL-DF project:

- Prepare strong scientific case for RIB science and applications
- Support, upgrade, optimize and coordinate ISOL-based European facilities and projects as a necessary step towards EURISOL
- Foster R&D on RIB production and Instrumentation towards EURISOL
- Get EURISOL-DF on the ESFRI list as a candidate project by 2018
- EURISOL as a single site facility as a long term goal

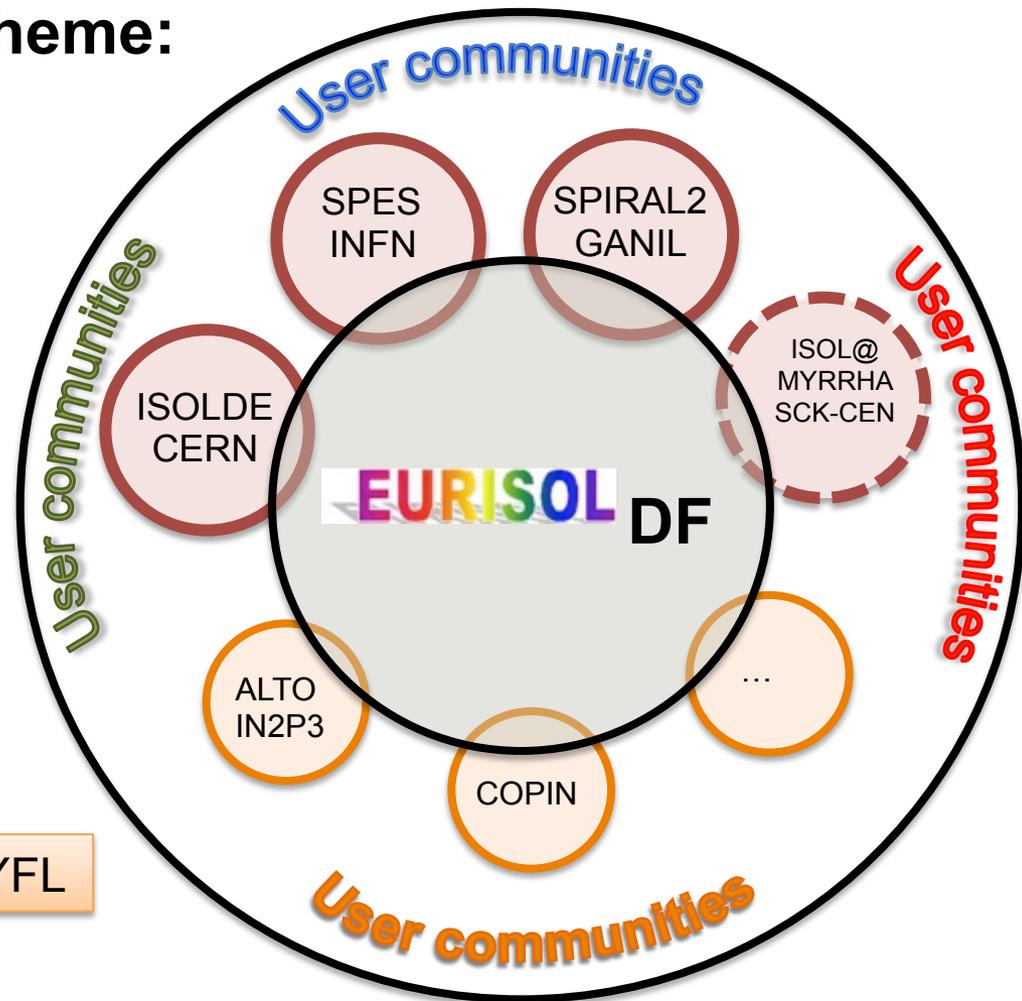
EURISOL – Distributed Facility (DF) Initiative

Proposed EURISOL-DF scheme:

- **EURISOL Science Case & Experiments**
 - Dedicated beamtime for EURISOL-DF experiments
 - Dedicated EURISOL-DF Scientific Council & PAC
- **R&D for EURISOL**
 - Dedicated Technical Advisory Committee
- **Legal entity (ERIC,...)**

Discussions with GSI/NUSTAR and JYFL

Close Coordination with EURISOL JRA in ENSAR 2 and EURISOL User group



EURISOL JRA in ENSAR2 Horizon 2020

Participants: CERN, GANIL, HIL Warsaw, IFJ Krakow, INFN, IN2P3/CNRS

Total EU Contribution: 640 k€

• **Tasks:**

- **EBIB** (CERN, GANIL, HIL Warsaw): Design of High Intensity and high duty cycle EBIS charge breeder
- **BeamLab** (CERN, GANIL, IFJ PAN Krakow, INFN-LNL, IPNO-IN2P3): Extraction of “difficult” ISOL beams through the production of molecules
- **CRIBE** (GANIL, IFJ PAN Krakow): Chart of ISOL RIB intensities in Europe
- **STUC** (all) STrUcturing the Community: Management, networking and meetings

EU Horizon 2020



10 TNA Facilities
(7 in ENSAR)

30 beneficiaries
15 countries

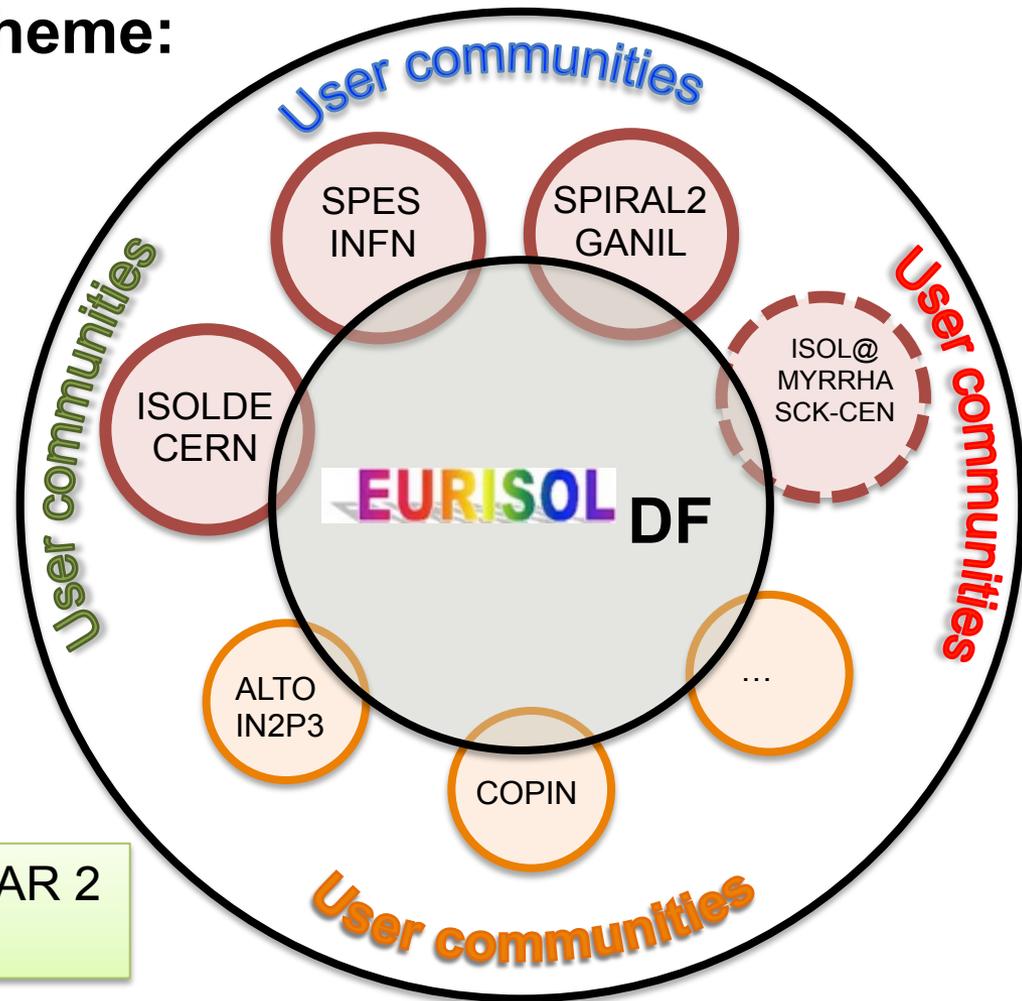
Community: 2700-3000
scientists and highly
qualified engineers

Coordinator: M. Harakeh
Coordinating institution:
GANIL
10M€ EU funds
Duration 4 years
Beginning by the end of 2015

EURISOL – Distributed Facility (DF) Initiative

Proposed EURISOL-DF scheme:

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Interaction with EURISOL JRA in ENSAR 2 and EURISOL User group

Discussions with GSI/NUSTAR and JYFL

http://www.eurisol.org/eurisol_df/

Project to be submitted for the 2018 update of the ESFRI roadmap