

The EURISOL Distributed Facility Initiative

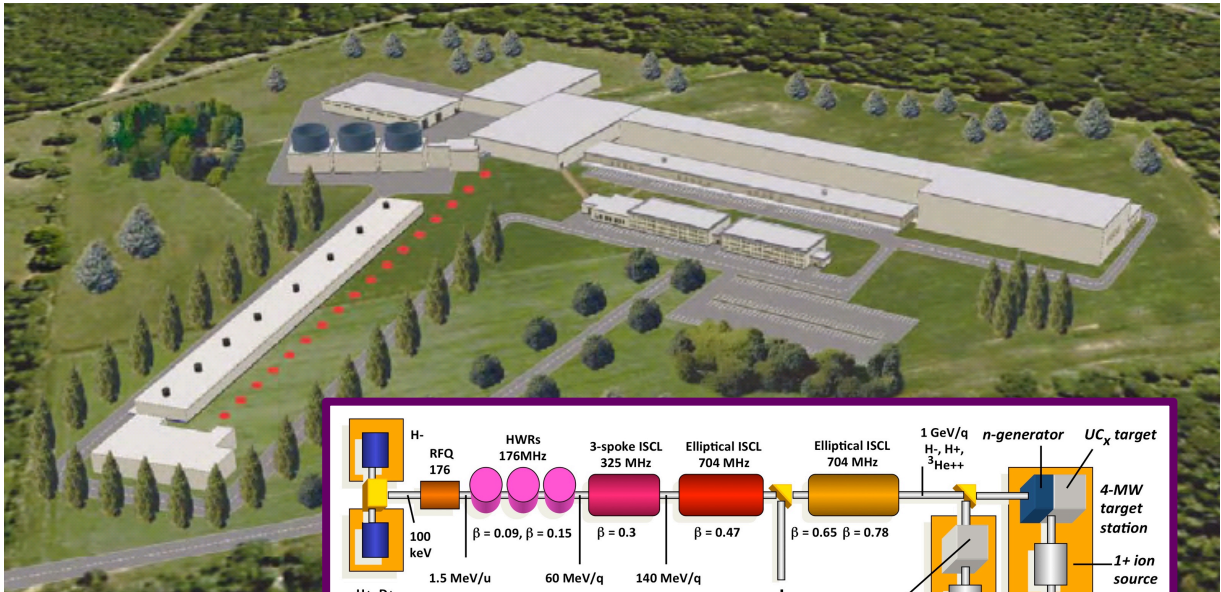
Marek Lewitowicz

On behalf of the EURISOL Steering Committee

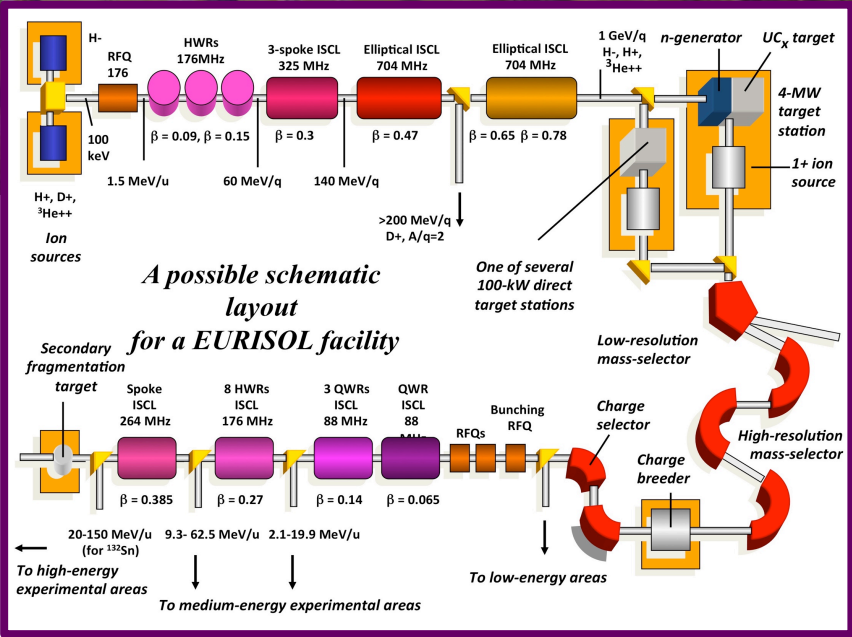
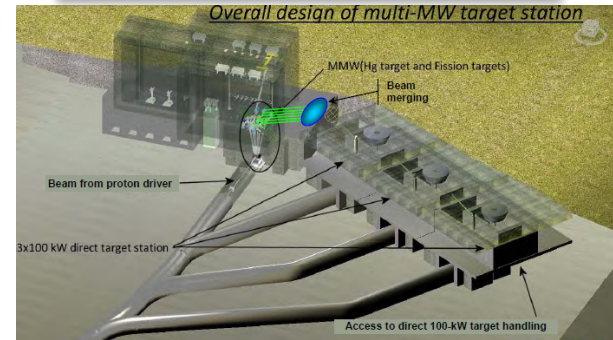
GANIL, Caen, France

- What is **EURISOL** ?
- What is EURISOL Distributed Facility Initiative?
- Further steps

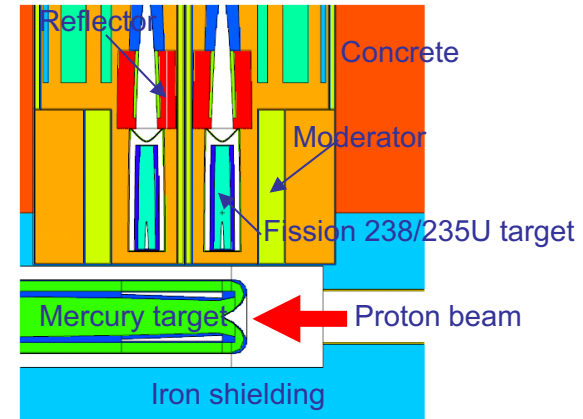
Facility as defined in the 2005-2009 EU funded Design Study



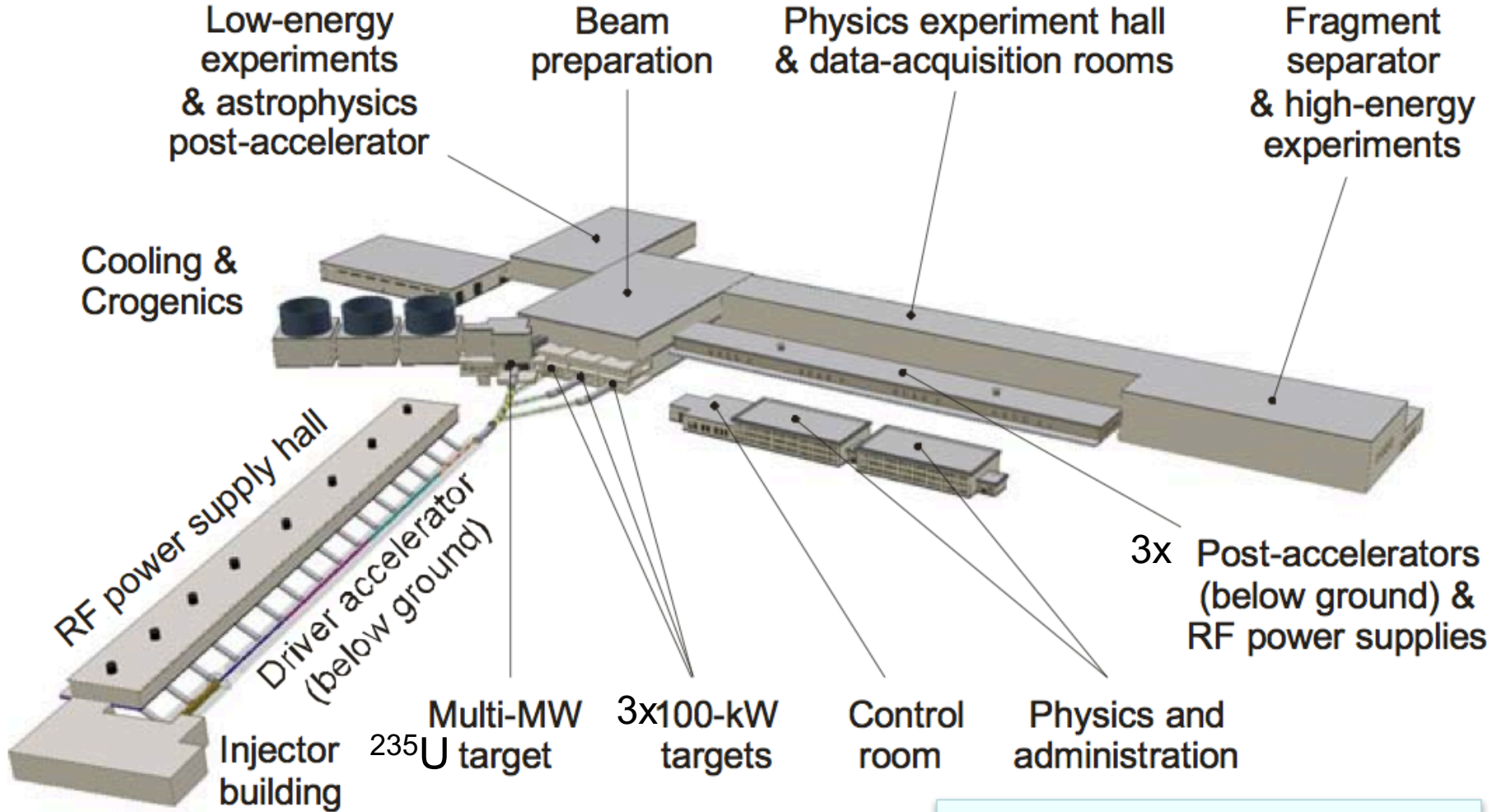
4 target stations:
Multi-user capabilities



5MW target



Up to 150 A MeV for ^{132}Sn

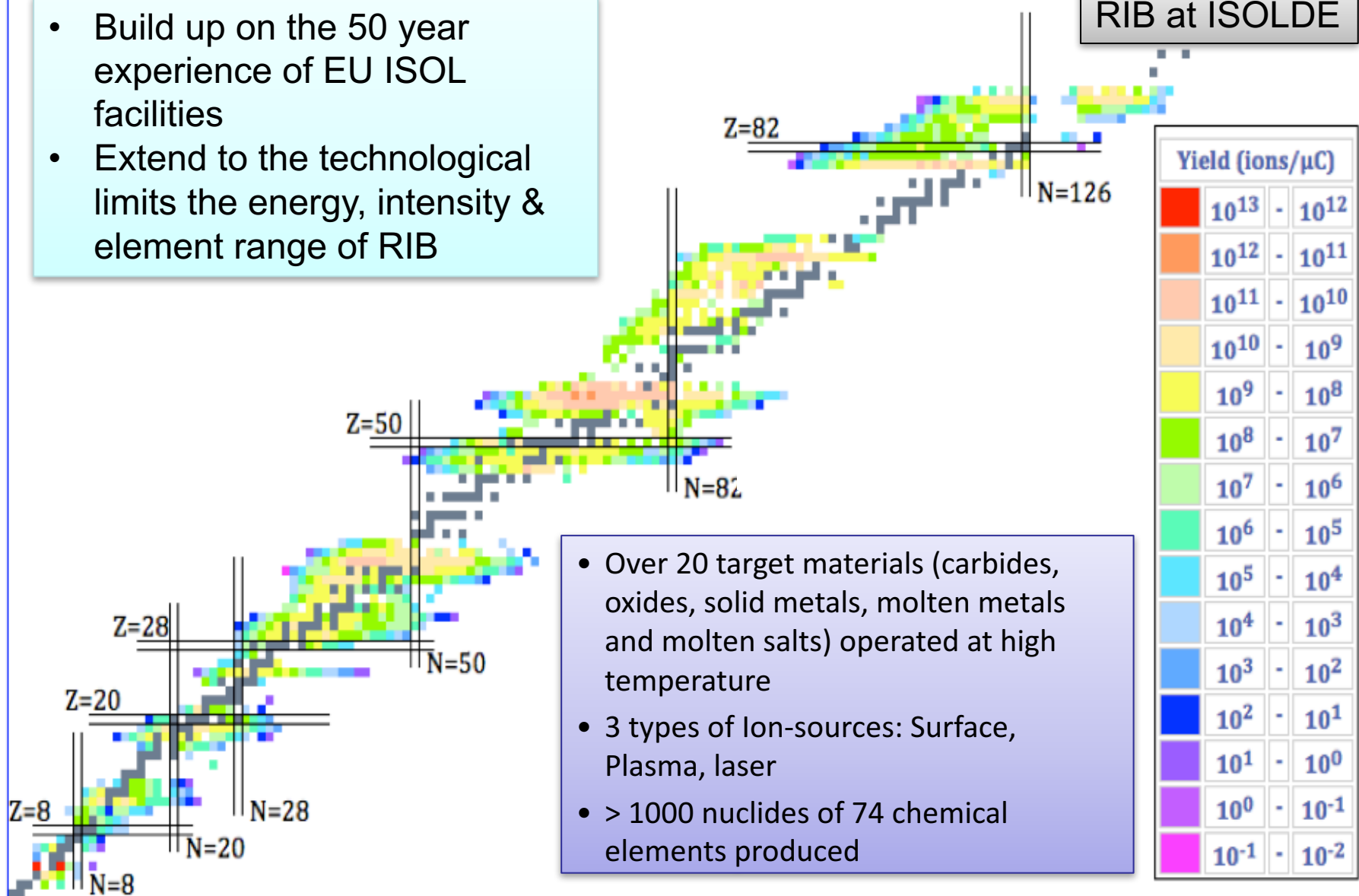


LINAC: H, D, He and A/q=2 ions up to 1 A GeV

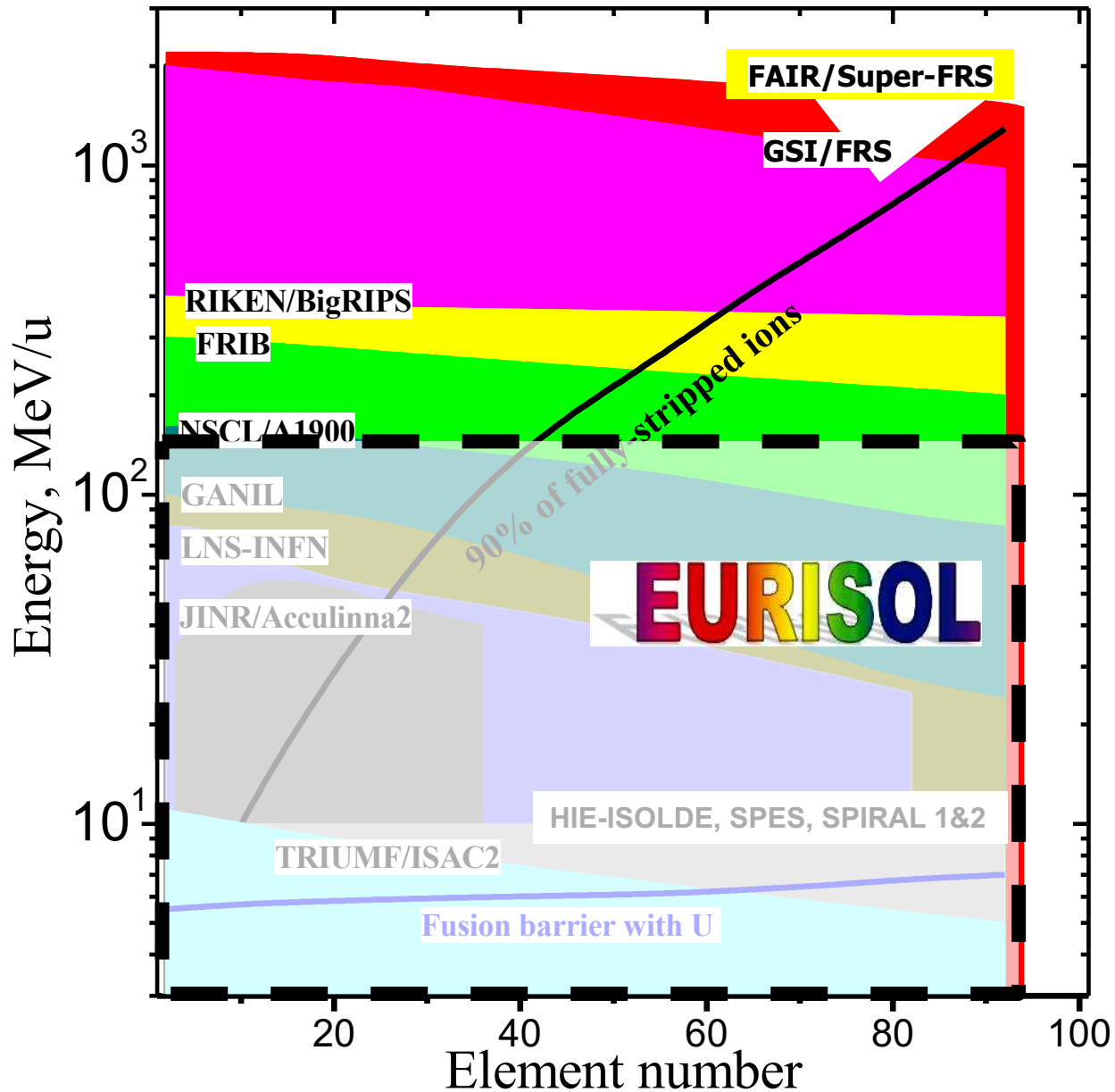
Multi-user capabilities

Cost: > 1.3B€

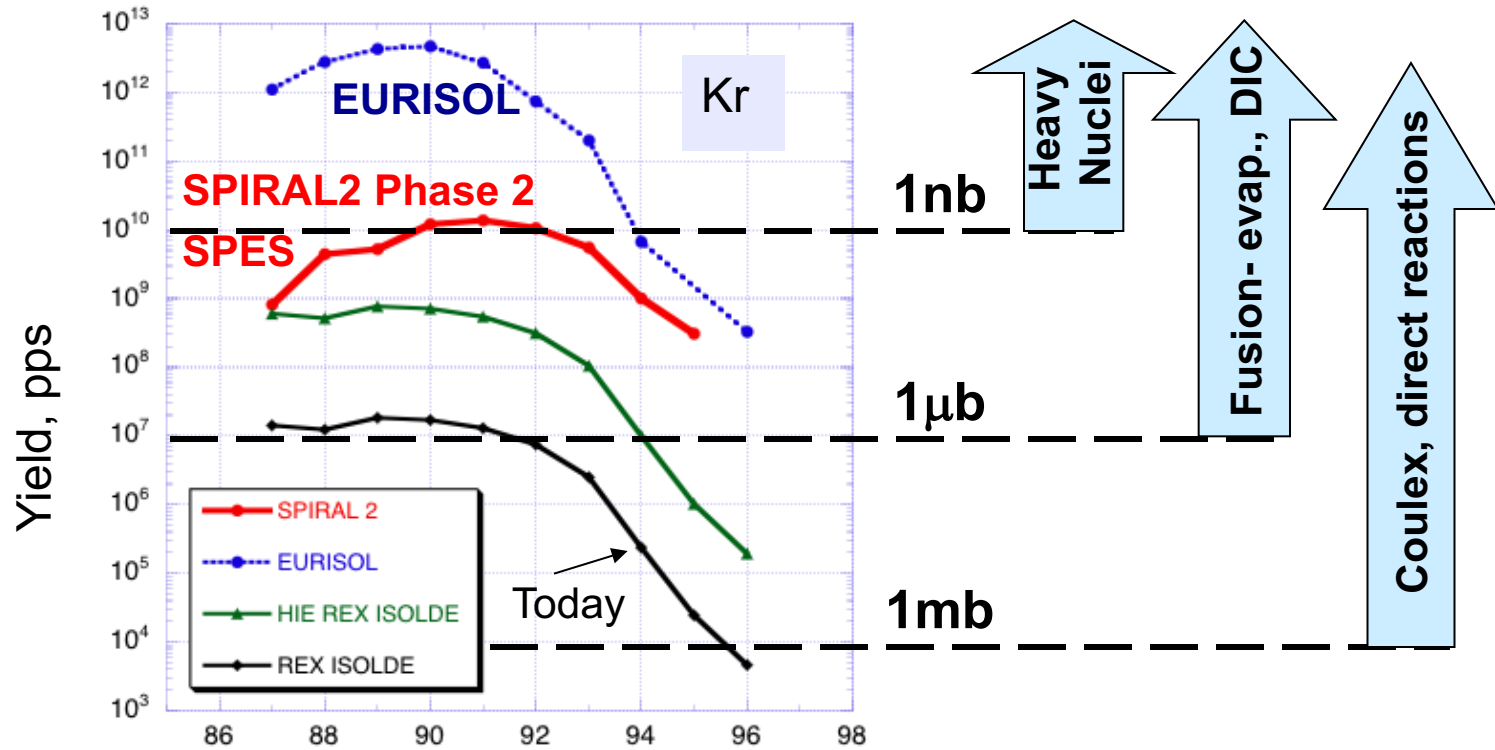
- Build up on the 50 year experience of EU ISOL facilities
- Extend to the technological limits the energy, intensity & element range of RIB



- Over 20 target materials (carbides, oxides, solid metals, molten metals and molten salts) operated at high temperature
- 3 types of Ion-sources: Surface, Plasma, laser
- > 1000 nuclides of 74 chemical elements produced



EURISOL: Precision experiments with RIB at low cross sections and very exotic nuclei at few MeV/nucleon



A

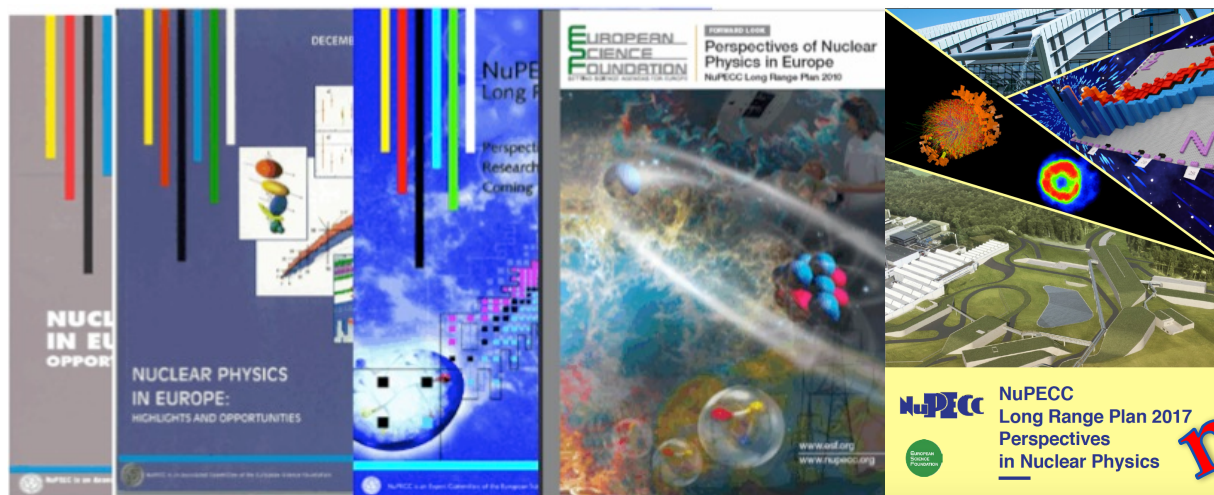
Ex.: At 1nb 1 nucl./day via fusion-evaporation

NuPECC Nuclear Physics European Collaboration Committee

Long Range Plan 2017

www.nupecc.org/lrp2016/Documents/lrp2017.pdf

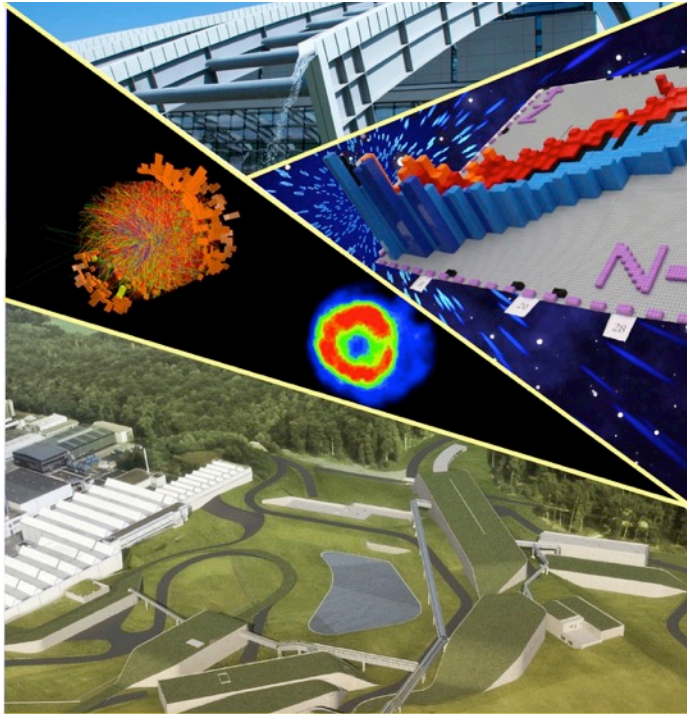
1991 1997 2004 2010 2017



- The LRP identifies opportunities and priorities for the nuclear science in Europe (*including new facilities and upgrades of existing ones*)
- The LRP provides the European Commission and national funding agencies with a framework for coordinated advances in nuclear science in Europe (*including EU funded coordination projects : ENSAR2, Hadron Physics IA,...*)

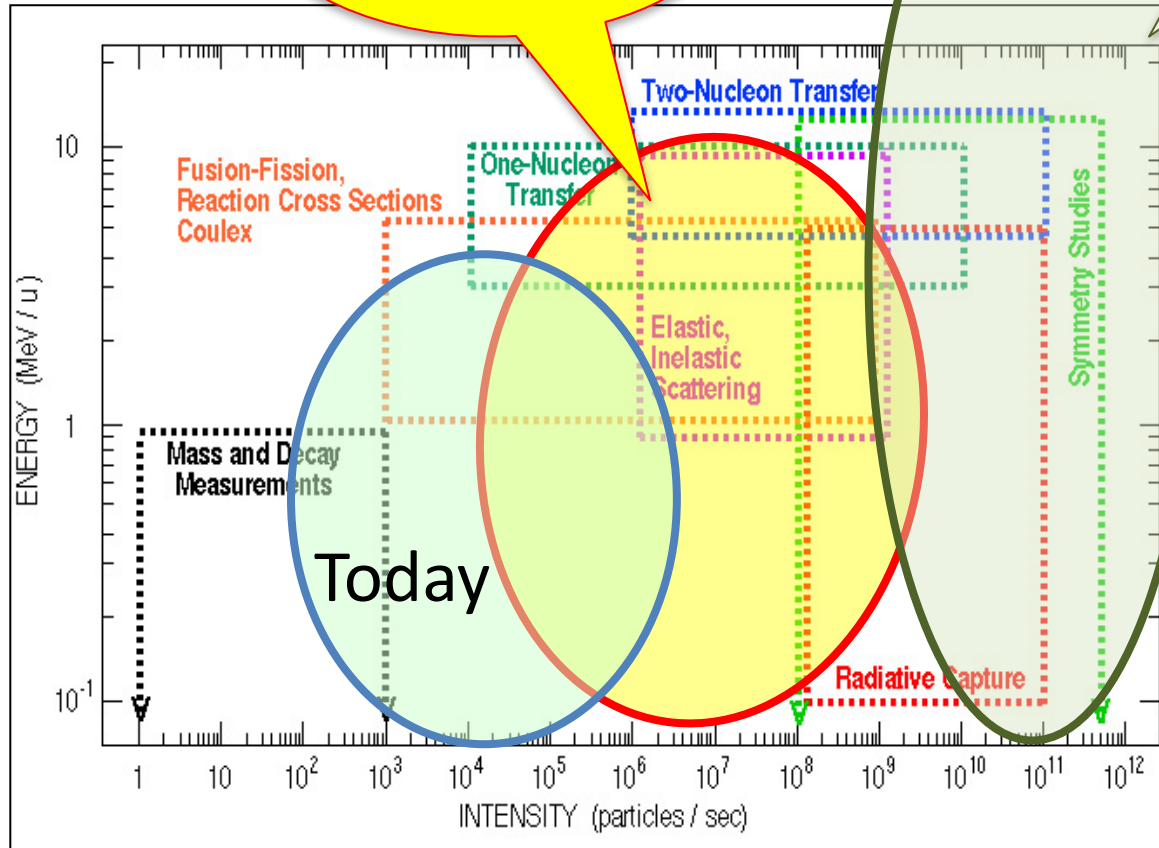
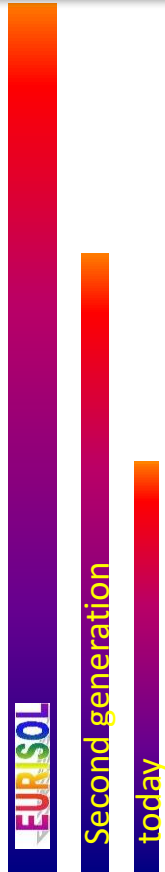
Support for construction, augmentation and exploitation of world leading ISOL facilities in Europe.

The urgent completion of the ESFRI facility SPIRAL2 along with SPES and the energy and intensity upgrade of HIE-ISOLDE (+ storage ring), including their unique instrumentation will consolidate the leading role of Europe. These ISOL facilities with low energy and reaccelerated exotic beams, offer extraordinary opportunities for scientific discoveries to probe questions that concern the atomic nucleus and nuclei in the cosmos. The successful completion and exploitation of these facilities would be the major step toward the ultimate European ISOL facility, EURISOL. With this aim, a strong European collaborative initiative, the EURISOL-Distributed Facility, is strongly supported to maximize synergies to address and solve new scientific and technical challenges.



Physics with ISOL RIB
Intensity & Energy domains

Precision nuclear structure physics & applications



HIE-ISOLDE,
SPES, SPIRAL2,
ISOL@MYRRHA
EURISOL-DF

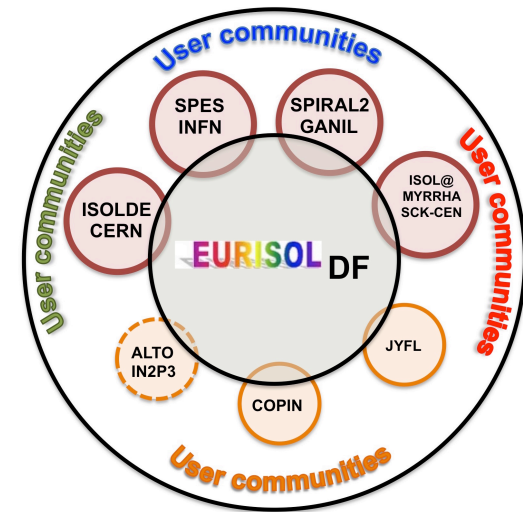
EURISOL



-> EURISOL-DF (Distributed Facility) Initiative from 2014 as an intermediate step towards EURISOL

EURISOL DF

EURISOL – Distributed Facility (DF)



Core members :
HIE-ISOLDE/CERN
SPES-INFN
SPIRAL2-GANIL
ISOL@MYRRHA-SCK*CEN

Associated Members
JYFL, Finland
COPIN Consortium, Poland
(ALTO, Orsay)

The goals of EURISOL-DF project (1/2)

- Implement a **new scientific policy** tackling major problems in nuclear physics at ISOL-based European facilities and in particular:
 - organise **experimental campaigns** using all available observables, techniques, facilities (at least two) and theoretical approaches to answer key questions in nuclear structure (eg. modifications of magic numbers in nuclei far from stability) and astrophysics (eg. genesis of middle to heavy mass elements in the Universe) ;
 - have a single entry point for a **significant fraction (up to 50%) of the Radioactive Ion beamtime** dedicated at ISOLDE-CERN, SPIRAL2-GANIL & SPES-INFN for the EURISOL-DF experiments and distributed via the EURISOL-DF Program Advisory Committee;
- Develop **R&D on RIB production and instrumentation** towards EURISOL and in particular:
 - organise and open to all EURISOL-DF members the R&D platforms to develop RIB (ex. ion sources, targets, separation techniques) and detector systems;

The goals of EURISOL-DF project (2/2)

- Promote **user driven policy** with an important role played by the EURISOL User Group and the EURISOL Instrumentation Coordination Committee in order to organise and optimize the campaigns of travelling detectors and arrays;
- Have **EURISOL-DF included on the ESFRI list by 2020** and attract additional member states and EU funds, in particular:
 - in-kind and/or cash contributions of the members for joint developments for EURISOL in the domains of accelerators, RIB production and instrumentation for experiments;
- Establish a **joint strategy in education and training in nuclear science** (eg. organising joint summer schools, hands on training, topical workshops and conferences);
- Develop **EURISOL as a single site facility as a long-term goal.**

EURISOL-DF Organisation (Preliminary)

Governing Body with Funding Agencies

Resources allocation

SPIRAL2
GANIL

SPES
INFN

ISOLDE
CERN

ALTO
COPIN
JYFL
ISOL@MYRRHA

EURISOL-DF TAC
SAC

EURISOL-DF Steering
Committee

EURISOL User
Executive
Committee

Give advice to the ESC with
regards to Scientific and
technical proposals

Define Scientific and technical strategies

- Scientific campaigns to be scheduled
- Foster Research & Developments
- Allocate funds

Propose Scientific cases
from the EURISOL
community

Instrumentation
Coordination
Committee

R&D Accelerator
Coordination
Committee

R&D Beam
Production
Coordination
Committee

EURISOLDF

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, JYFL

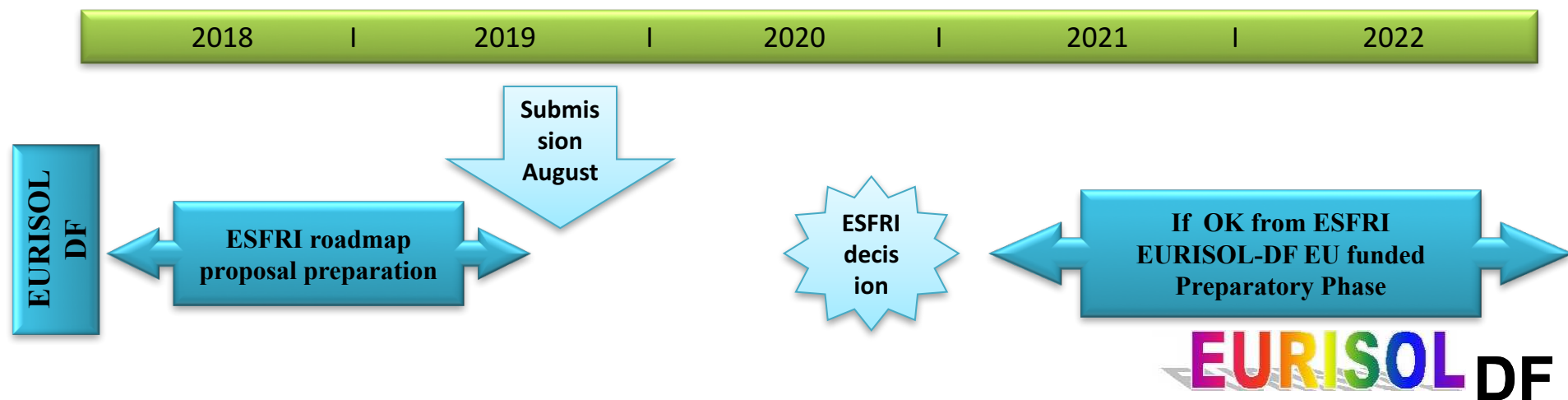
The MOU is implemented by a Steering Committee with one representative per signatory. The members are:

MJG Borge/G. Neyens (CERN), M. Lewitowicz (GANIL, chair), A. Maj (COPIN), S. Pirrone (INFN), L. Popescu (BEC), A. Jokinen (JYFL)
A. Bracco (NuPECC representative) and Y. Blumenfeld (EURISOL JRA ENSAR2, invited), Berta Rubio (Chair of the EURISOL User Executive Committee, invited)

-> EURISOL-DF Initiative from 2014

EURISOL – Distributed Facility (DF) Initiative – next steps

- EURISOL-DF Workshop in Lisbon in **November 15-16, 2017**
- 5 Working groups (Science, Accelerators, RIB, Instrumentation, Legal aspects) -> reports by **end of 2017**
- First draft of the full EURISOL-DF proposal including the WG reports, feed-back from the Lisbon conference, NuPECC LRP recommendations by **March 2018**
 - *Writing Committee (B. Rubio, Y. Blumenfeld and M. L.) in a close collaboration with the EURISOL Steering Committee and EURISOL UEC*
- Lobbying and green light from the labs and at least 3 countries by **November 2018**
- Draft of the full EURISOL-DF proposal by **January 2019**
- Consultation of the draft with the involved countries and community with an involvement of the EURISOL User Executive Committee: **March-July 2019**
- Submission of the EURISOL-DF project to ESFRI by **July-August 2019 (dead-line August 2019)**



EURISOL-DF Pan-European added value:

- Optimal approach to study major questions in modern nuclear structure physics, nuclear astrophysics and related applications
- European coordination of EURISOL related physics and technical R&D
- Secured resources for operation of the ISOL facilities and additional resources for R&D and detectors
- Clear strategy for upgrades of the complementary EU ISOL facilities towards EURISOL

Close collaboration and synergy with FAIR/NuSTAR

BACKUP SLIDES

EURISOL-DF Instrumentation Coordination Committee (**EICC**)

The role of the EICC is to reinforce the synergies and coordinate efforts between the facilities and the major collaborations on existing and new detectors in order to carry on **R&D** and to **reach construction milestones** and **coordinate experimental campaigns** at all RIB facilities which are members of EURISOL

Traveling detectors (examples)

Gamma-ray detectors

Charged particle detectors

Neutron detectors

AGATA

EXOGAM 2

PARIS

ACTAR-TPC

GASPARD

FAZIA

NEDA

DEMON

EURISOL and other RIB facilities (example)

Precision experiments with RIB at low cross sections and very exotic nuclei at few MeV/nucleon

