GANIL/SPIRAL2 in the EURISOL DF

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GANIL
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- High intensity accelerator
- Handling of the high radioactivity and maintenance
- High-power converter and big volume UCx target
- Very high intensity RIB
- Innovative Instrumentation

www.ganil-spiral2.eu
**Phase 1 (2015)**
Increase the intensity of stable beams by a factor 10 to 100 – High intense neutron source

- Linac driver
  - 33 MeV p, 40 MeV d (5 mA)
  - A/q = 3 - 14.5 A MeV
- HI (1 mA)

**DESIR Phase 1+ (2019)** (low energy facility)

- Production up to $10^{14}$ FFI/s

**Phase 1++ (2019?)**
(A/Q = 6-7 Injector)

- 10 µA (6 x $10^{13}$ pps) A<50

**Phase 2 (2021?)**
- Produce exotic nuclei in abundance (factor 10 to 1000 higher than present facility)
- Expand the range of exotic nuclei to A>80

**Investment:**
- GANIL >500 M€ (estimation 2012)
- SPIRAL2 Phase 1&2 (2014): 210 M€
- New exp. halls and detectors ≥ 23 M€

**SPIRAL2 is on the list of the European Strategy Forum on Research Infrastructures (ESFRI)**

**AGATA Campaigns (2015-2018)**

**SPIRAL1 Upgrade (2016)**
- New light RIBs
High intensity accelerator

<table>
<thead>
<tr>
<th></th>
<th>Q/A</th>
<th>I (mA)</th>
<th>Energy (Mev/u)</th>
<th>Max beam Power (KW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protons</td>
<td>1/1</td>
<td>5</td>
<td>2 - 33</td>
<td>165</td>
</tr>
<tr>
<td>Deuterons</td>
<td>1/2</td>
<td>5</td>
<td>2 - 20</td>
<td>200</td>
</tr>
<tr>
<td>Ions</td>
<td>1/3</td>
<td>1</td>
<td>2 - 14.5</td>
<td>45</td>
</tr>
<tr>
<td><strong>Ions (option)</strong></td>
<td>1/7</td>
<td>1</td>
<td>2 - 8</td>
<td>48</td>
</tr>
</tbody>
</table>

Average beam intensity equivalent to that of ESS or EURISOL driver

- **Towards production**
- **Towards DESIR**
- **Future extension**
High intensity accelerator

Accelerator (target, spectrometers) Protection System

LBEC :
- 1 DCCT
- 12 fentes (T° et I)

LME :
- 2 ACCT/DCCT

LINAC :
- 2 ACCT/DCCT (LME et LHE)
- 20 BPM
- 20 BLM

LHE :
- 2 ACCT/DCCT
- 12 anneaux de pertes
- 12 BLM
- 1 TOF
- 2 MIGR
- 1 trèfle
- Thermocouples
Installation is going on

LINAC tunnel

Beam lines & support

SC Cavities

HI ECR Source

LI ECR Source

RFQ
Handling of high radioactivity and maintenance

**LINAC beam**

RIB Production hall

Identification Station

1+ RIB to DESIR Hall

1+ beam lines

Maintenance and waste management area

RFQ Cooler & High Resolution Separator

ECR Charge booster

N+ beam transfer lines to CIME existing cyclotron

CIME cyclotron

Production hall Details
High-power converter and big volume UCx target

- Uranium carbide targets constructed and irradiated!
- Release times < 50%
- Structures understood!
SPIRAL 2 Phase 2: High-intensity ISOL RIB facility

SPIRAL 2: Experiments with RIB at low cross sections and very exotic nuclei at few MeV/nucleon

SPIRAL2 – ISOL facilities

ISOL RIB beams:
- high intensity, optical quality & purity

Versatility:
- light & HI, high-intensity stable-ion & RIB

SPIRAL2 – In flight facilities

- Multi-beam capabilities,
- Months of beam-time
- World-class arrays & detectors
EURISOL DF: Intermediate step towards single site project

- GANIL/SPIRAL1
- HI E-ISOLDE
- SPES
- SPIRAL2
- ISOL@MYRRHA (Low energy RIB)
- EURISOL DF

Targeted Intensity of RIB in pps

Year

- 2015
- 2020
- 2025
- 2030
- 2035
Nominal operation of GANIL/SPIRAL2:
- up to 79 weeks/y of stable-ion beams
- up to 53 weeks/y of RIB
- up to 5 beams (2 RIB) simultaneously
- 800-900 users
Timeline GANIL & SPIRAL2

- **2013**
  - GANIL cyclotrons

- **2014**
  - Construction Phase 1
  - LINAC, NFS, S3

- **2015**
  - Commisioning Phase 1

- **2016**
  - Upgrade SPIRAL1
  - NFS experiments
  - S3 experiments

- **2017**
  - SPIRAL2 Phase 1+
  - Design, R&D, prototypes DESIR
  - Civil Construction DESIR
  - Construction Phase 2?

**GANIL cyclotrons**

**SPIRAL2 Phase 1**
- CSS1 standalone (CB energies)
- AGATA @ GANIL (10 m. in 4 years)

**SPIRAL2 Phase 1 +**
- Upgrade SPIRAL1

**SPIRAL2 Phase 2**
- Design, Safety File Phase 1+
- RIB, DESIR

**SPIRAL2 Phase 1**
- LINAC Beams

**GANIL**
- SPIRAL2
- SPIRAL1
- SPIRL2
- SPIRL2 Phase 1+
- SPIRAL2 Phase 2

**GANIL & SPIRAL2 Timeline**

M. Lewitowicz 26/10/2014
GANIL/SPIRAL2 in EURISOL DF

- High intensity accelerator (SPIRAL2 LINAC)
  - Operation with very high intensity stable-ion beams
  - Accelerator Protection System
- Handling of the high radioactivity and maintenance
- High-power 200kW converter and big volume UCx target (SPIRAL2 Phase 2)
- Very high intensity RIB (SPIRAL2 Phase 2)
- Innovative Instrumentation (ACTAR, PARIS, GASPARD, spectrometers, …)

www.ganil-spiral2.eu
Preparation of the EURISOL DF project for the ESFRI roadmap 2018 update

- Regular EURISOL MOU Steering Committee meetings and actions
  - Preparation of the proposal for 2017
  - Discussion with representatives of EU member states
  - Lobbying, lobbying, lobbying
- Tight links with EURISOL User Group and EURISOL JRA in ENSAR2
- EURORIB 2015 conference – dedicated session
- Dedicated EURORIB DF conference in 2016 with a “EPS label” in collaboration with Nucl. Phys. Board of EPS