

CONCLUDING REMARKS

*Physics Cases and
Instrumentation for
EURISOL-DF, the next step
towards EURISOL*

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The EURISOL-DF approach

- **Start from a (well-defined) physics question**
 - Define the key observables needed to answer the question
 - ➔ Which instrumentation needed / at which facilities available ?
 - ➔ Can the instrumentation be moved?
 - Which isotopes need to be studied – at what energies ?
 - ➔ Defines the possible facilities in Europe
 - Make a **coordinated plan of research**, with all involved partners (different research teams focusing on specific sub-aspects of research plan)
 - Include also the necessary **nuclear theory groups from the beginning**

EXAMPLES: - reactions with light nuclei (Alessia / Nicolas)
- fundamental interaction studies (Tommi / Adam)
- 78Ni region (David / Andrea)
- Shape isomers in Z=50 and Z=82 regions (Bogdan/Andrea)

Several physics cases and Instruments can benefit from a EURISOL-DF approach

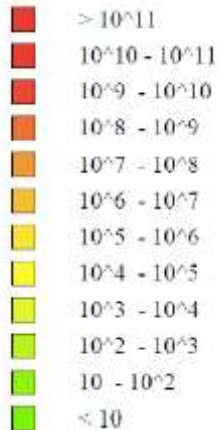
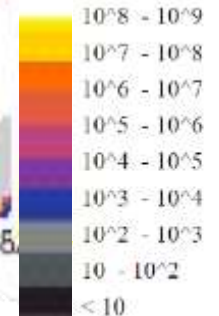
p (40 MeV) + ^{238}U
200 μA
fission

SPES

very intense Ag

very intense Hg

Yield (at/ μC)



p (1.4 GeV) + ^{238}U , others
2 μA
spallation,
fission, fragmentation

ISOLDE

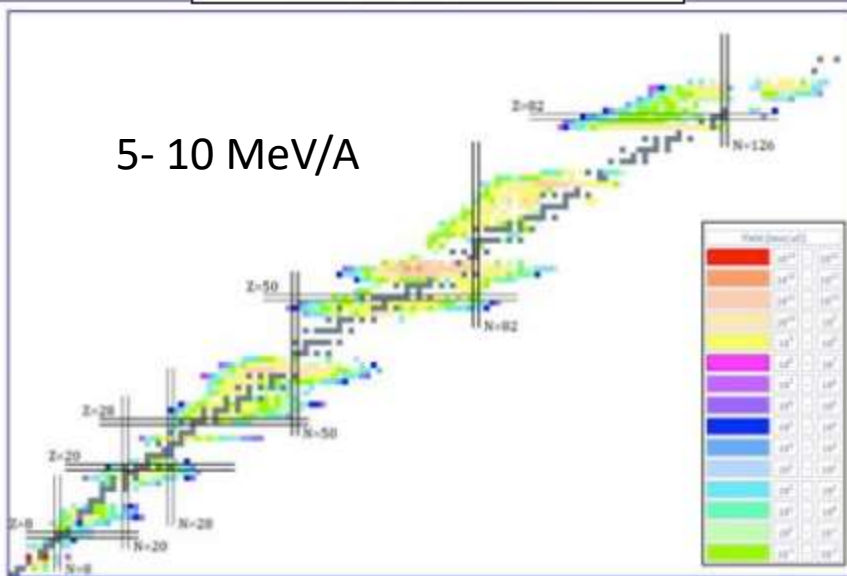


GANIL-SPIRAL2

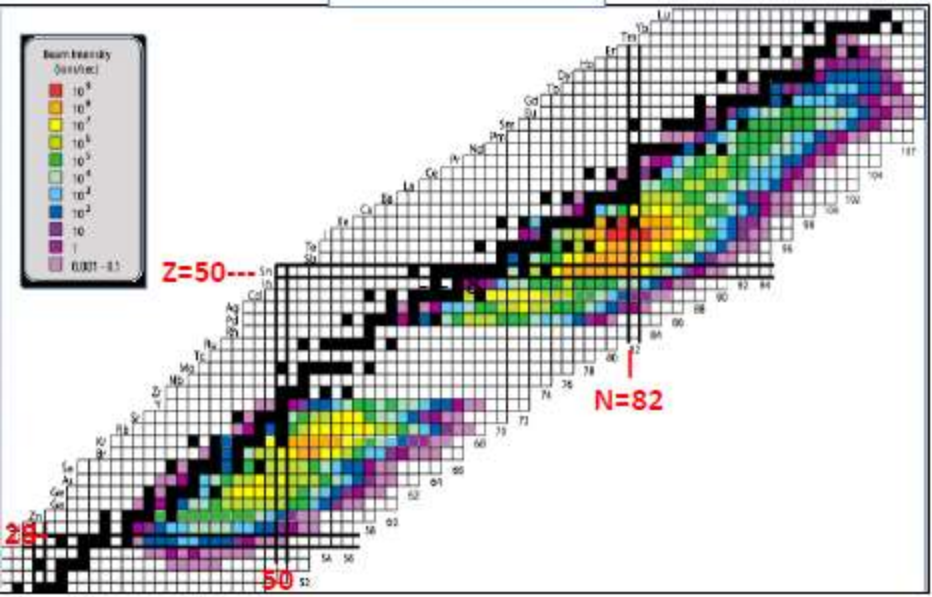
<http://u.ganil-spiral2.eu/chartbeams/>



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INFN - SPES ALTO



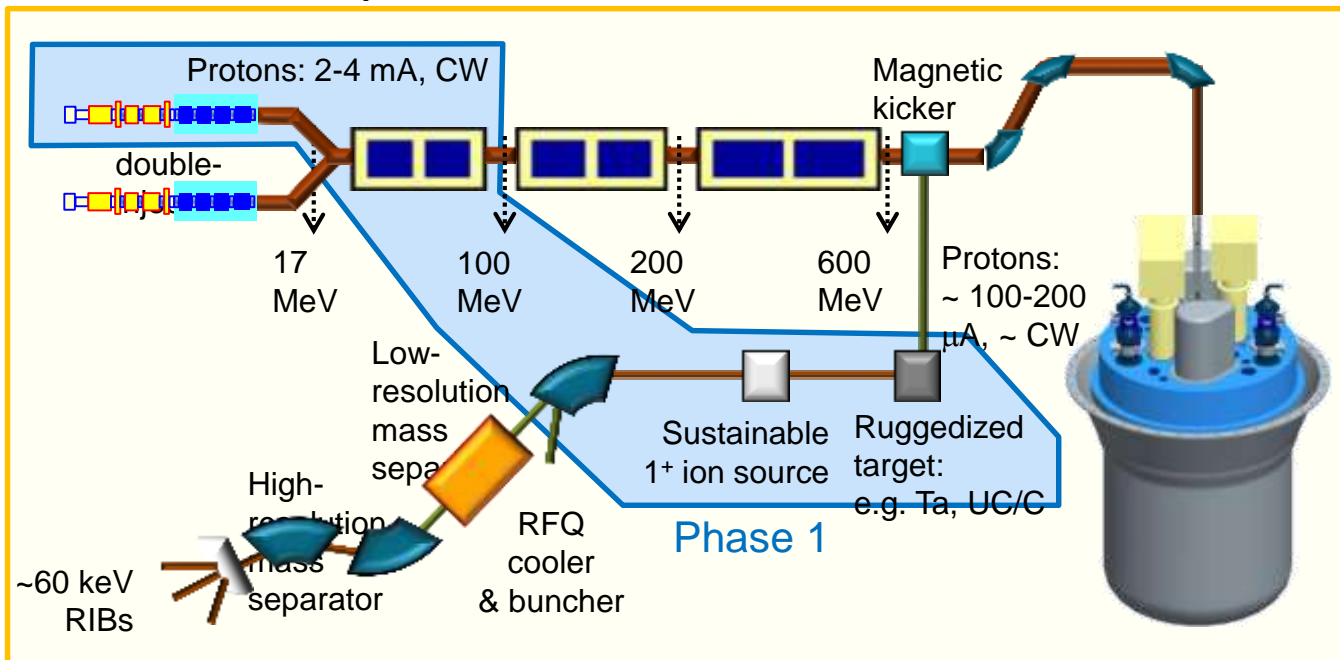
<https://web.infn.it/spes/index.php/news/spes-beam-tables>

EURISOL-DF:
 Enhance complementarities
 &
 avoid duplication of efforts in
 the beam developments



ISOL@Myrrha

- 4 mW CW proton beam of 100 MeV
- **IDEAL place for technical developments** related to **high-power ISOL** technology
 - Testing high intensity ion source & optimized RIB-extraction optics
 - Testing new target materials for long term & high-power operation
- **Physics program: choose only topics that need very long beam times !**
 - Study of weak interactions using correlation methods !
 - Focus initial beam development to those beams !
 - Need **pure** beams !



An example (T. Eronen)

- **Physics question:** study of fundamental interactions with RIB by determining V_{ud} with ultimate precision
 - **key observables** needed to answer the question
 - ✓ Determine the ft of superallowed $0^+ \rightarrow 0^+$ decays
 - high-precision measurements of Q_β (masses), lifetimes, branching ratio's.
 - ➔ At which facilities is the necessary instrumentation available (or can the instrumentation be moved?)
 - ➔ Mass: Penning traps (fixed to facility)
 - ➔ Branching ratio: Efficiency-calibrated HPGe detector to 0.1% precision (movable – beam requirements: clean beam, high statistics, beta-efficiency)
 - ➔ Lifetimes: beta-detection, pure beams, ...
 - **Which isotopes** need to be studied – at what energies ?
 - ➔ Defines the possible facilities in Europe
 - Make a **coordinated plan of research**, with all involved partners (different research teams focusing on specific sub-aspects of research plan)
 - Make a proposal (with detailed sub-proposals) to the EURISOL-DF PAC