

TNA 04 WP17 JYFL-JYU

Accelerator Laboratory, Department of Physics
(JYFL-ACCLAB),
University of Jyväskylä, Finland



ENSAR

ENSAR Town Meeting
Warsaw 18 June 2013
Rauno Julin



JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ



32 Months Summary



TNA04

Experiments

- 41 supported experiments (50)
- 2305 supported hours (3000)
- 231 supported users (200)
- 2439 supported visitor days (2000)

Supported hours = $A \times B/C$

A = total beam time hours for the experiment

B = number of the supported (financial) participants

C = total number of the participants

41 supported experiments

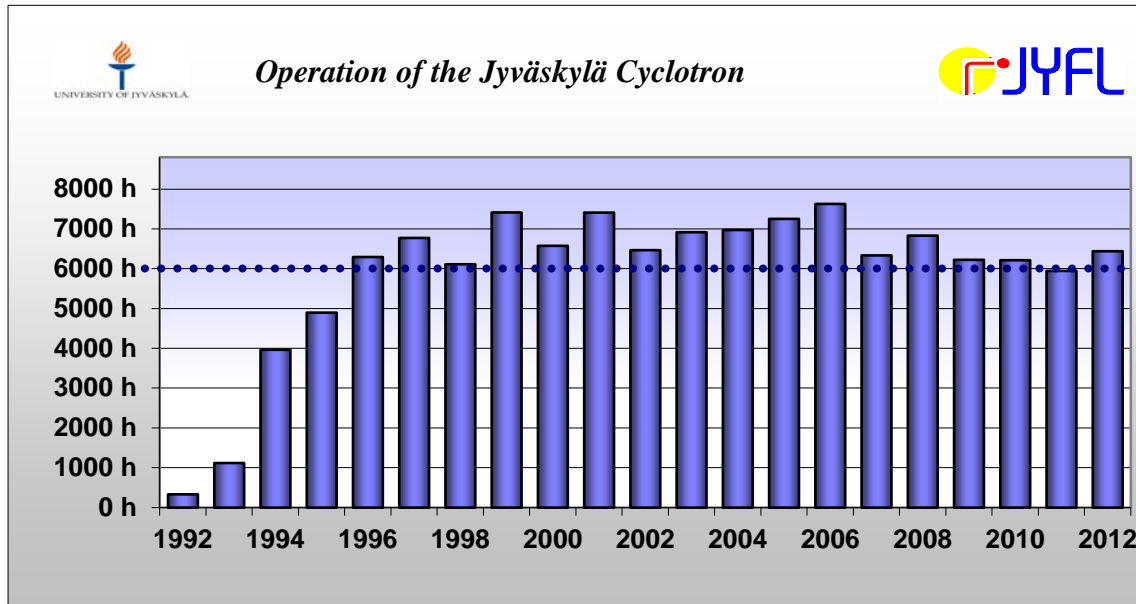
22 RITU+JUROGAM2+SAGE+LISA+DPUNS tagging experiments

2 IGISOL experiments

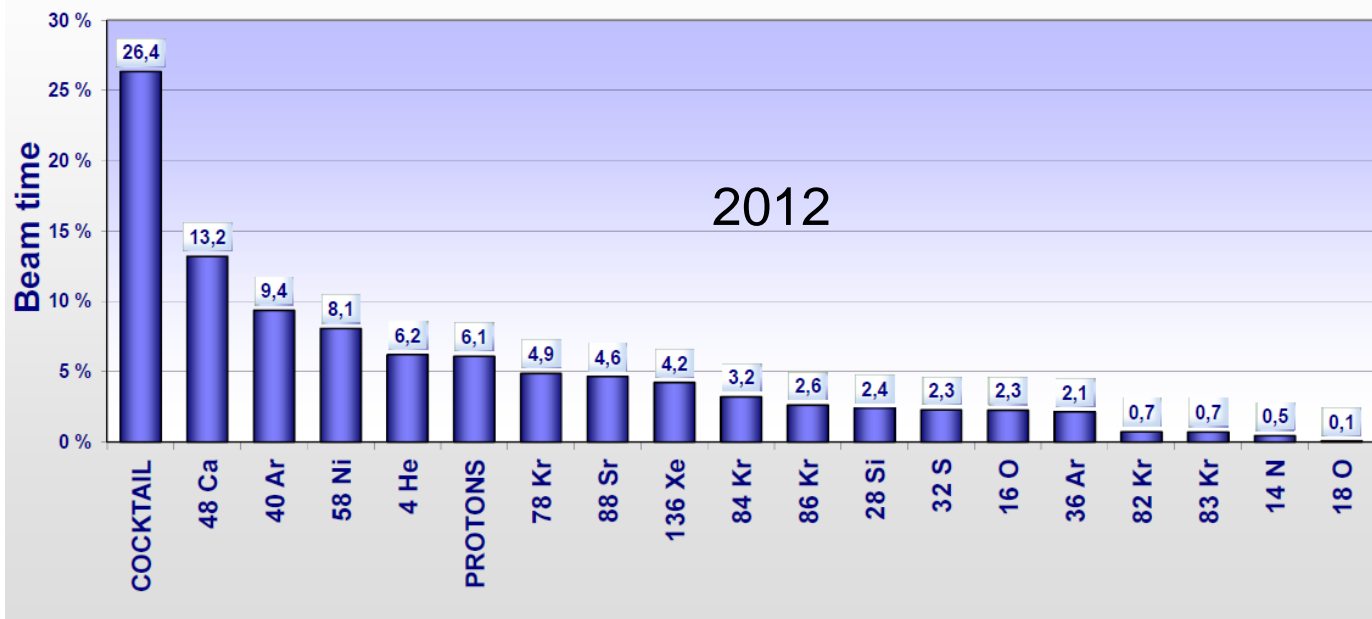
2 Nuclear reaction experiments

5 Ion-beam application experiments

More than 6000 beam time hours a year



**$K=130\text{MeV}$
Cyclotron**



Financial

- travel and subsistence support 246 300€ (300 800€)
- access costs 208 800 € = $(2305 \times 90,60\text{€})$ (271 800 €)

Scientific output

Peer reviewed publications since 1st of September 2010:

68 acknowledging EURONS (6 PRL and 8 PL)

12 acknowledging ENSAR (1 PRL)

JYFL-PAC Statistics Sept 2010 Onwards

- Average of 35 proposals per year asking for total of 286 days.
- Success rate of 67%, not a fixed proportion.
- Requests distributed:
 - 42% Spectroscopy (RITU, JUROGAM, SAGE, LISA, DPUNS)
 - 26% Ground-state properties (IGISOL, Traps, Lasers)
 - 12% Nuclear Reactions
 - 19% Applications (not including commercial services)
- Lower numbers recently due to the IGISOL reconstruction and associated larger than normal backlogs (350 days)

JYFL-PAC Membership

- Sean Freeman, University of Manchester UK (chair)
- Mikael Block, GSI Germany
- Thomas Duguet DSM/IRFU/SPhN France
- Thomas Nilsson Chalmers University of Technology Sweden
- Wolfram Korten DSM/IRFU/SPhN France
- Marek Pfützner University of Warsaw Poland

Membership for 3 years, chair for 1.5 years.

Half of PAC changed at any one time.

Invited on basis of expertise in JYFL science areas.

JYFL-PAC Procedures

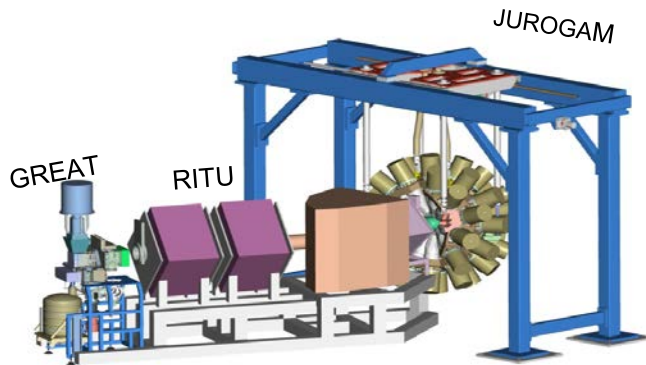
- Two calls per year with deadlines 15th March and 15th September.
- No presentations, but contact with PI by email/phone, if needed.
- Judged on: scientific excellence after verifying the feasibility and suitability of the proposal to JYFL facilities.
- Each PAC members scores each proposal: 3=MUST, 2=SHOULD, 1=COULD, 0=DON'T ... ½ marks allowed.
- List of proposals ranked by average score considered carefully at end of meeting to determine appropriate cut off.
- No separate users-selection panel.

Highlight

Phys. Rev. Lett. 109, 012501 (2012)

Shell-structure and pairing interaction in superheavy nuclei: Rotational properties of the $Z=104$ nucleus ^{256}Rf

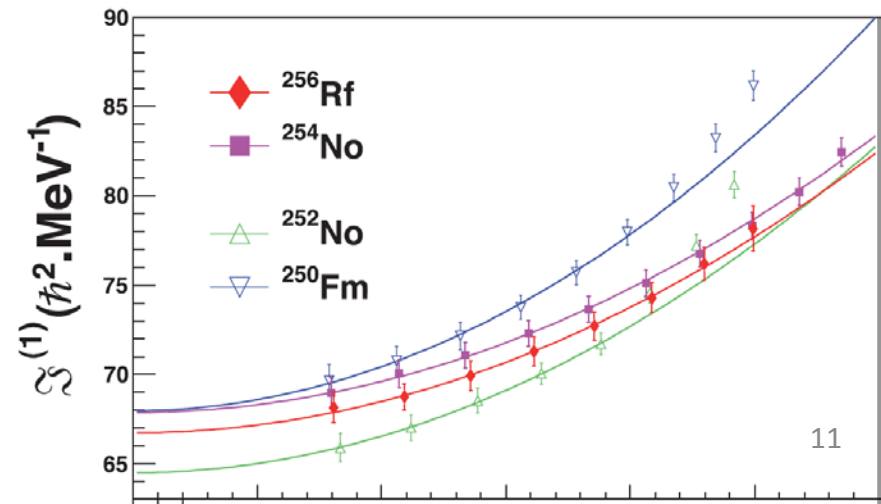
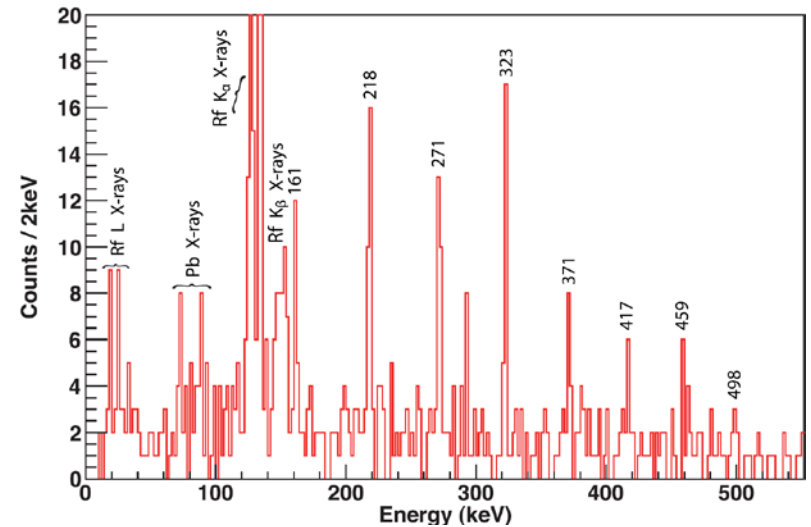
Supported participants from Liverpool, Strasbourg, Orsay, Sacley, GSI, and Bratislava



at the high- Z limit of
in-beam spectroscopy:

- $^{208}\text{Pb}(^{50}\text{Ti}, 2n)^{256}\text{Rf}$ - 17nbarn
- Gammapool detectors + RITU-GREAT
- Strasbourg contribution in beam development

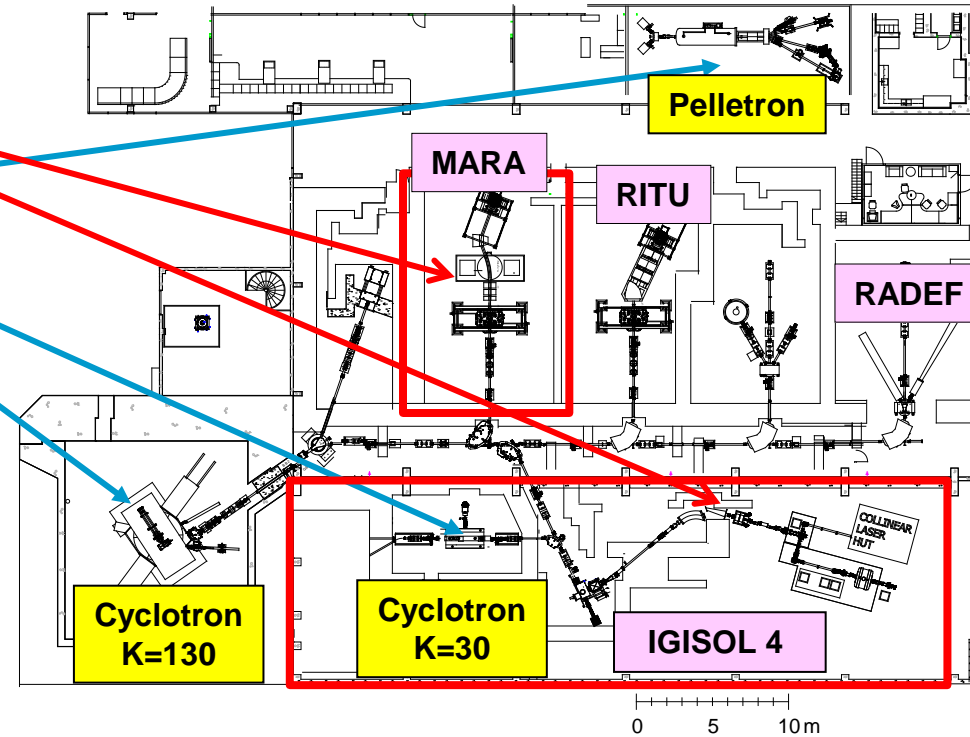
$J^{(1)} \rightarrow$ no $Z = 104$ shell gap



ENSAR2

Upgrade of the JYFL-ACCLAB going on

- new instrumentation
 - three accelerators
- more beam time for difficult experiments, tests and new applications



STATUS of JYFL-ACCLAB

- ❑ Part of the Department of Physics of JyU
- ❑ One of the prime technology forums of JyU.
- ❑ International infrastructure in Finland
foreign investments of 10 M€
- ❑ Renewed status in Finland:
Research Center of Excellence 2012-2017
- ❑ Accredited European Space Agency (ESA) test facility



NordForsk 2011: Comparing Research at Nordic Universities using Bibliometric Indicators

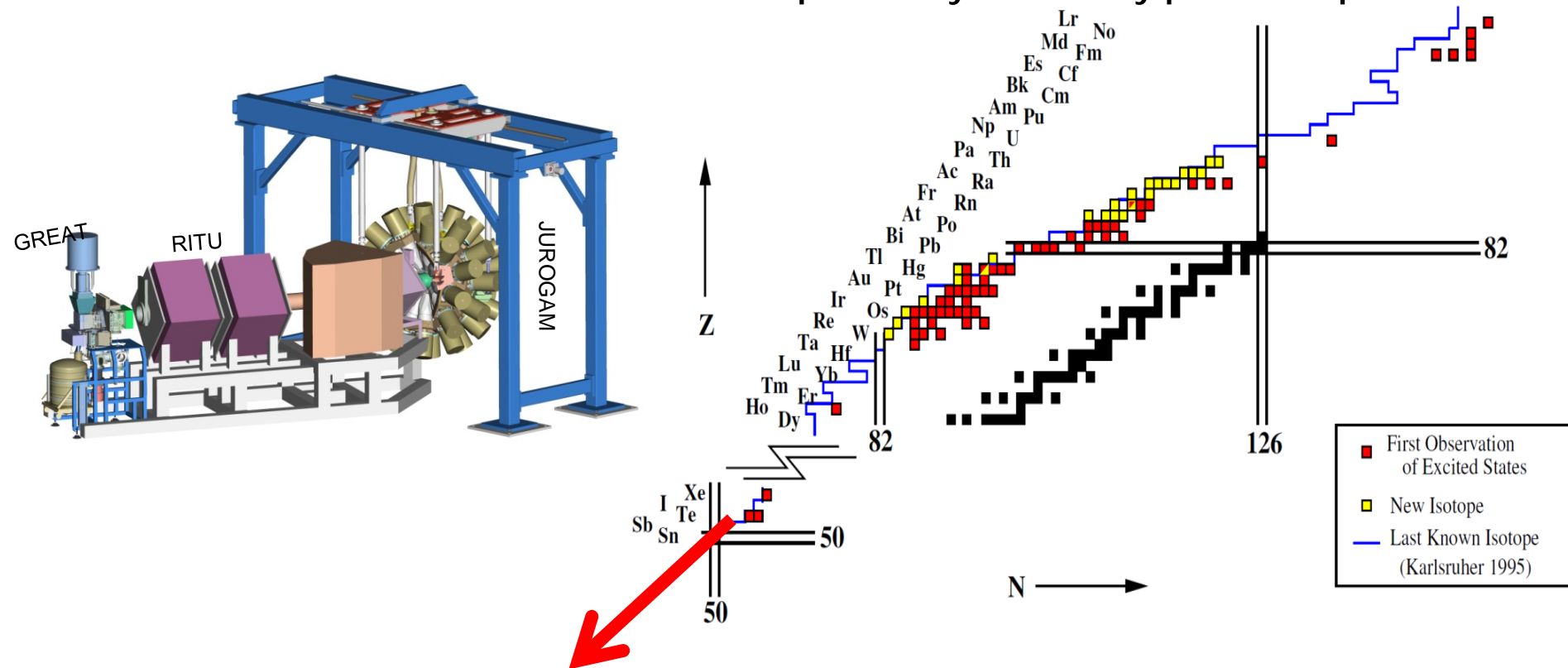
*Among 30 Nordic Universities,
in Physics + Mathematics, JyU is among the 3 top universities*

Access to be offered

Research Themes
and Instrumentation

Nuclear structure at the limits (RITU+JUROGAM+SAGE+LISA+DPUNS)

- ❑ Leader in nuclear structure studies of super-heavy and heavy proton-drip-line nuclei.



JUROGAM II (6.1 %)
15 EUROGAM Phase 1 + 24 EUROBALL Clover units
from Gammapool
TDR (320 Lyrtech digital channels)
(free running mode with high rates)

Towards lighter proton-drip line nuclei - MARA

A new vacuum-mode separator – MARA
→ better mass selection in RDT experiments

Focal plane
+ gas cell

MD

ED

QQQ

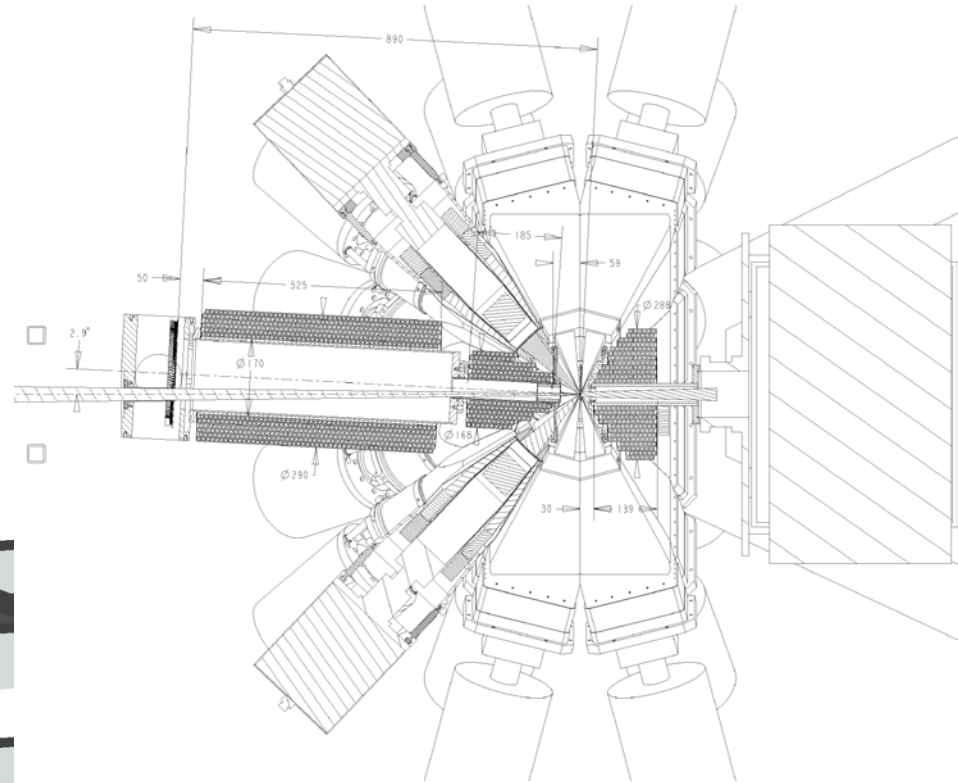
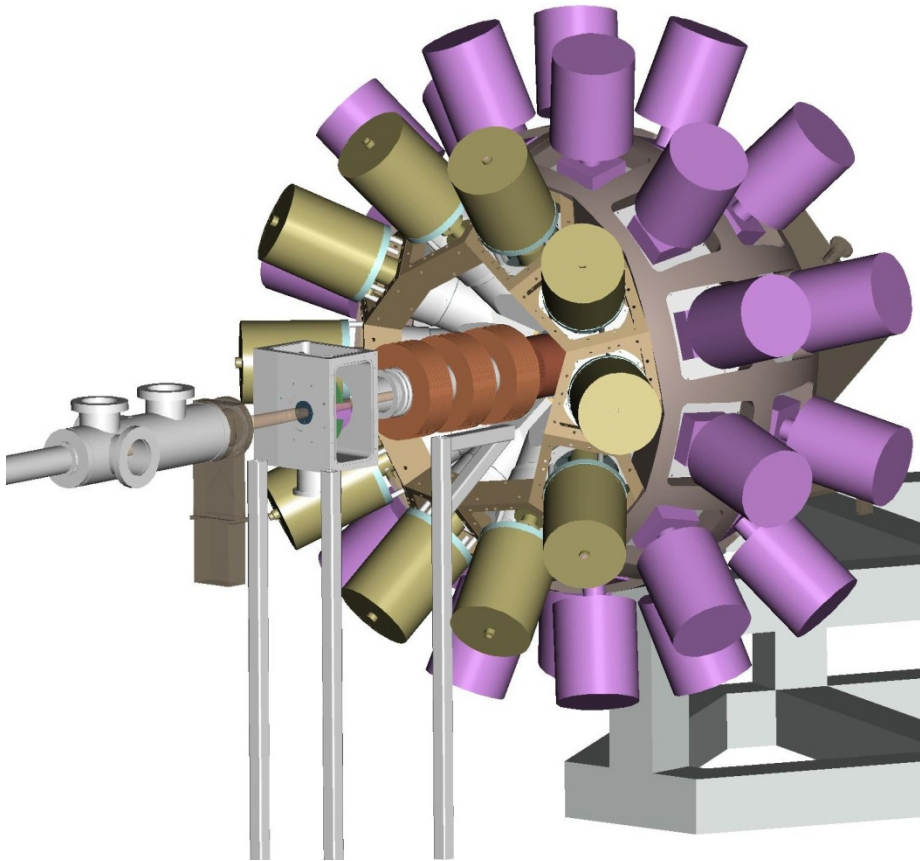
Beam

- Solid angle acceptance (central m/q and energy) 10 msr
- Typical transmission ~12% per charge state

Gamma-electron coincidences with RDT

SAGE

JUROGAM2+Solenoid electron spectrometer

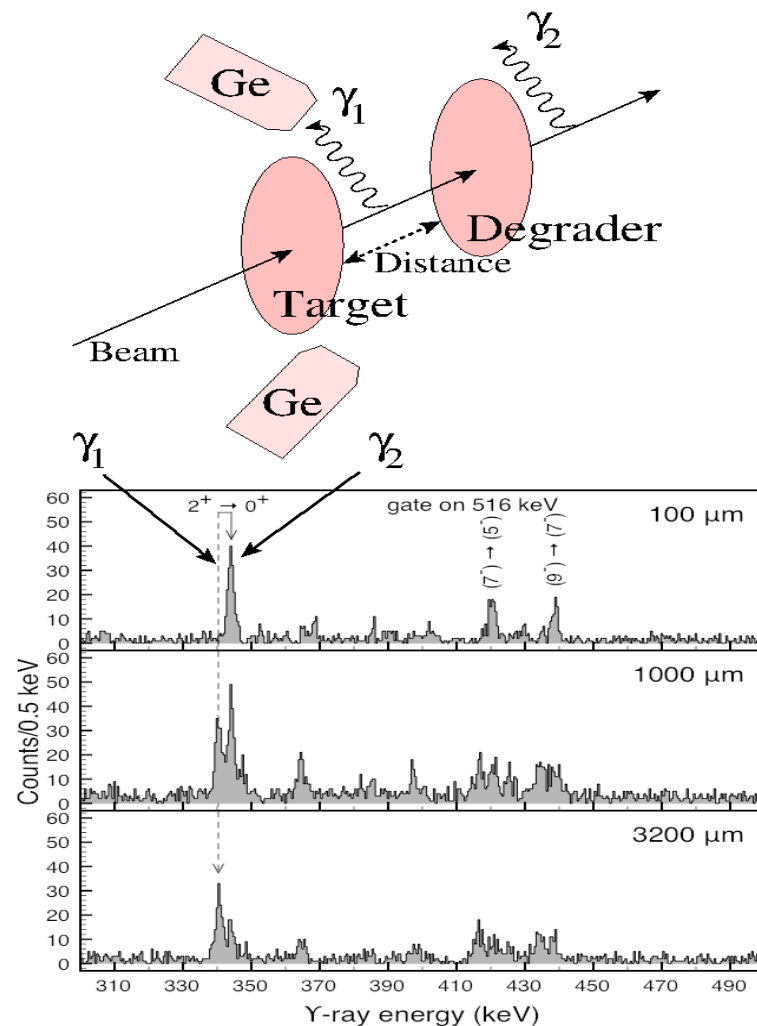
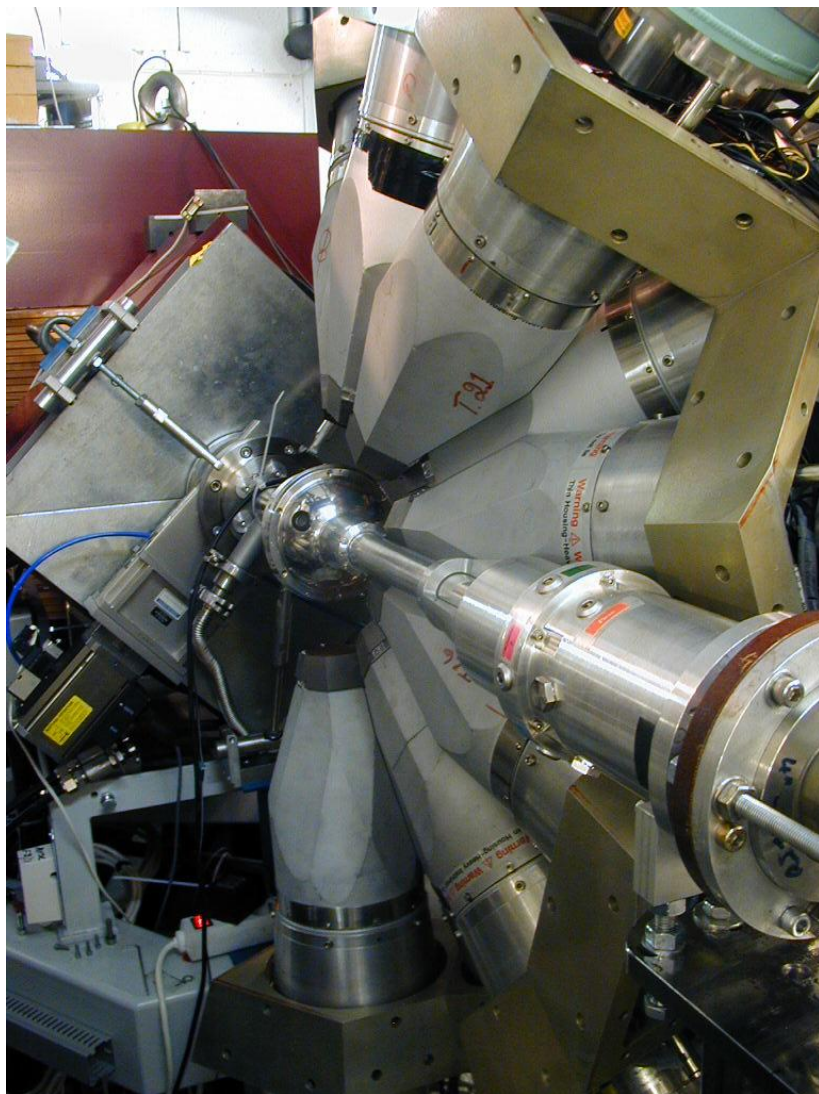


24 EUROBALL clovers
+Phase 1 detectors

➤ Simultaneous Gamma and CE studies

RDT- Differential-Plunger-lifetime measurements

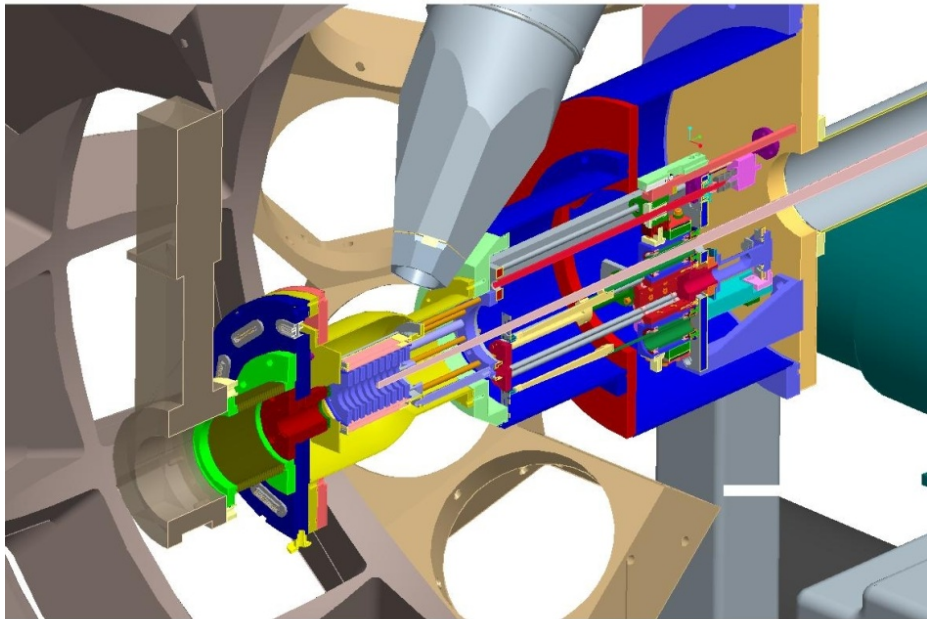
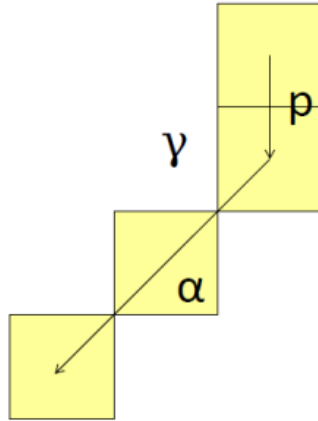
Plunger inside JUROGAM at RITU



Fast particle emitters with RDT

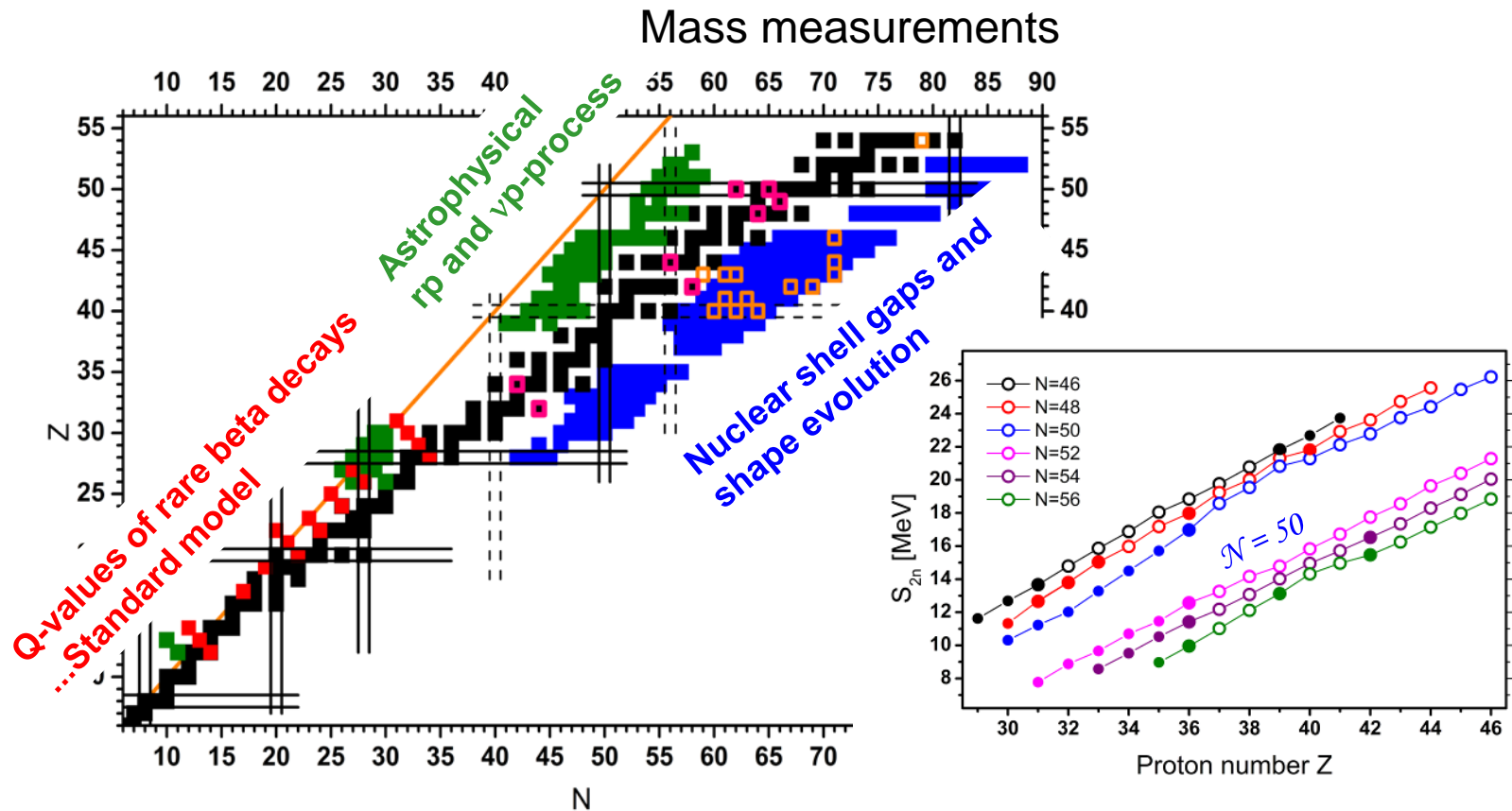
LISA

detector array for detection
of prompt light ions



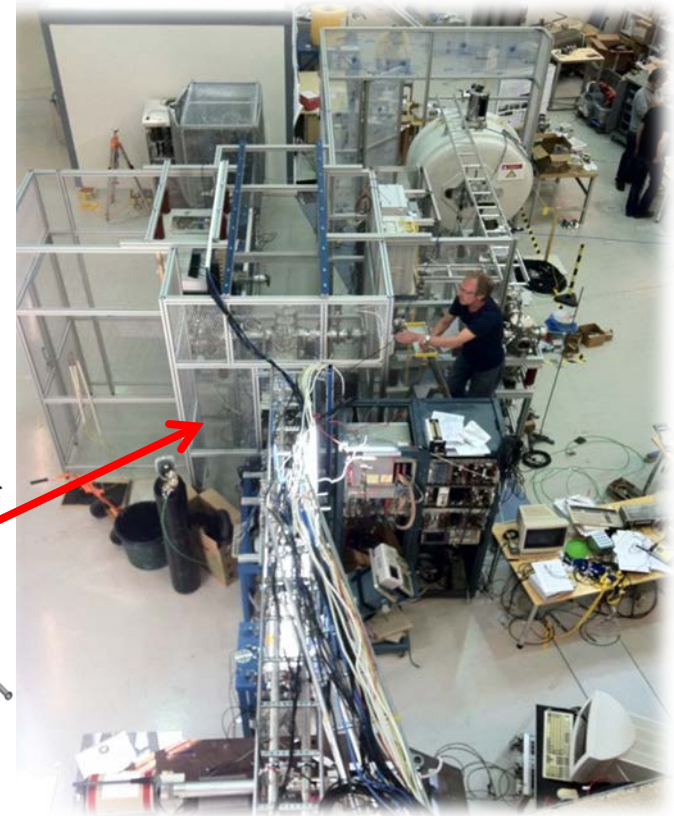
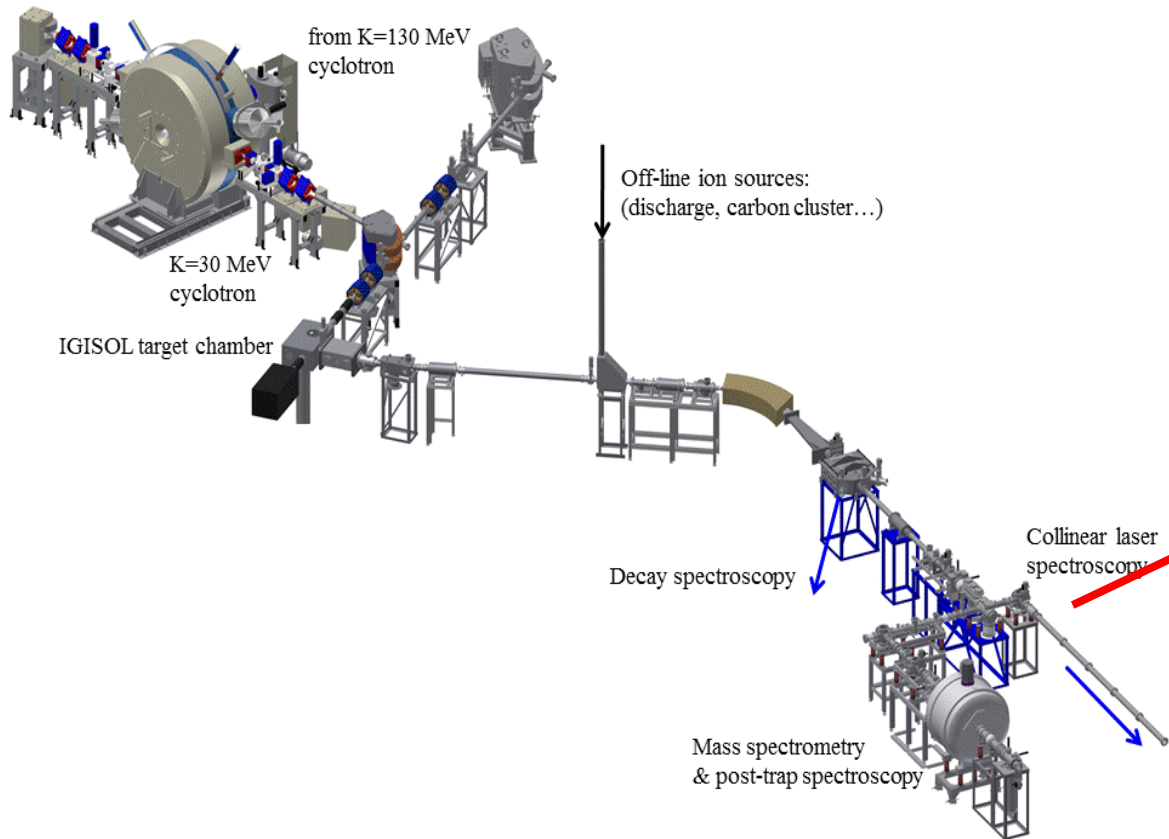
Rare isotope beam science – IGISOL (Low-Energy RIB)

- ❑ IGISOL ion guide + ion traps + lasers
- ❑ Leader in precision measurements of ground-state properties of rare isotopes



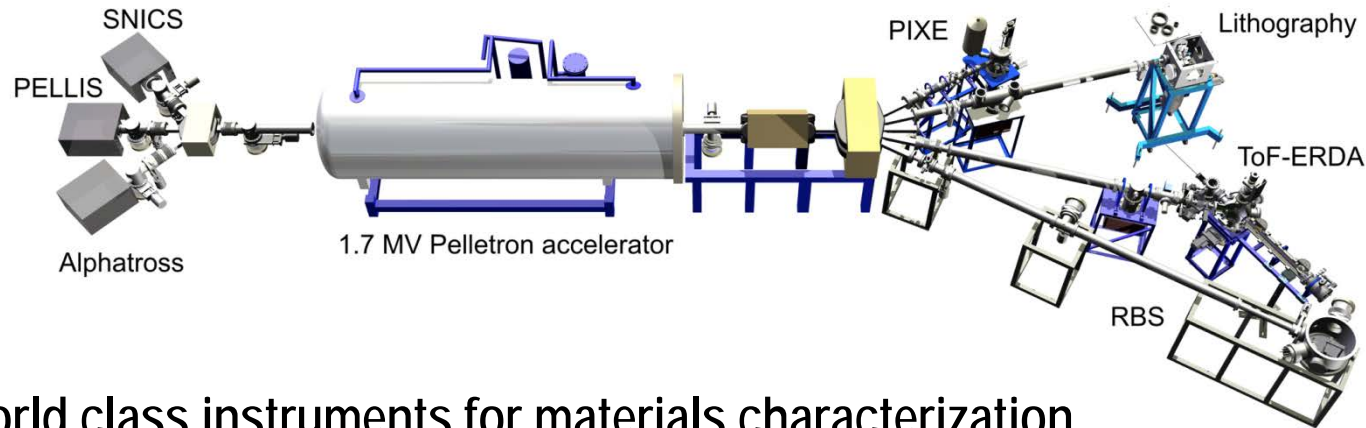
IGISOL 4

Beams from the both cyclotrons

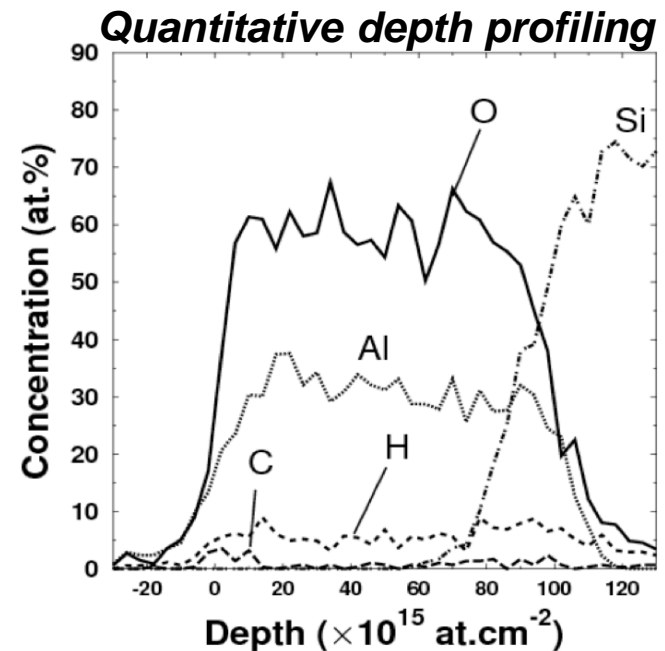
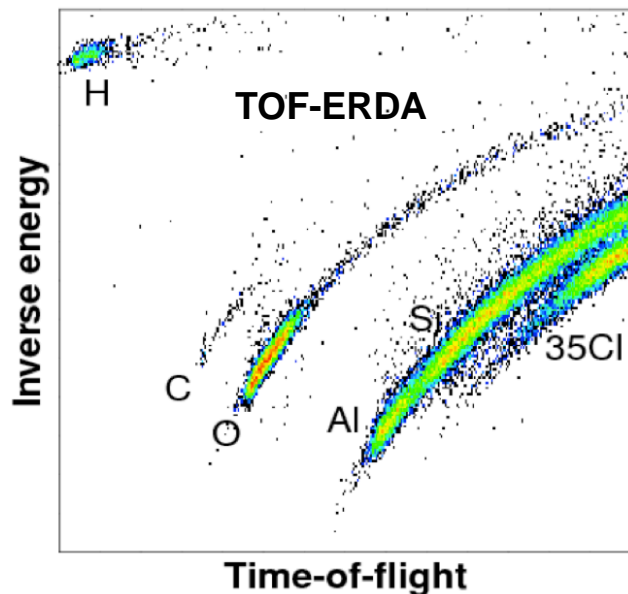


laser-spectroscopy
tandem Penning trap
neutron converter
detector systems

Accelerator based materials physics (PELLETRON)

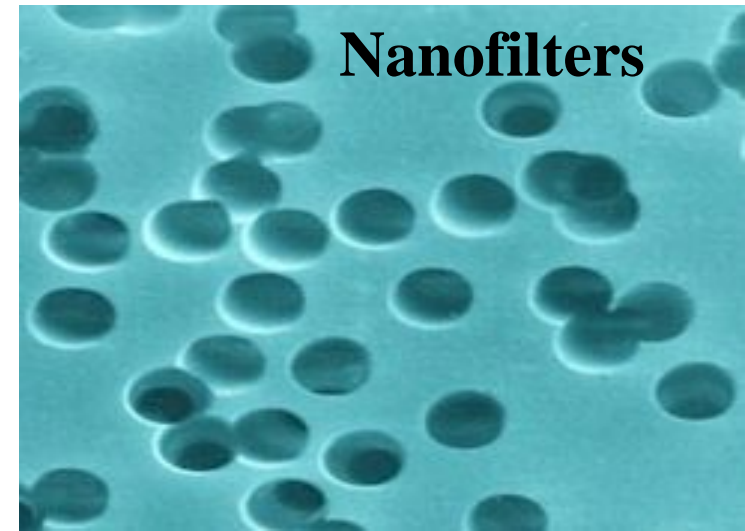


- ❑ World class instruments for materials characterization and modification developed and constructed at Pelletron



8.6 nm thick atomic layer deposited
insulating Al₂O₃ film on Si

Industrial applications (RADEF)



JYFL-ACCLAB - RADEF accredited ESA test site

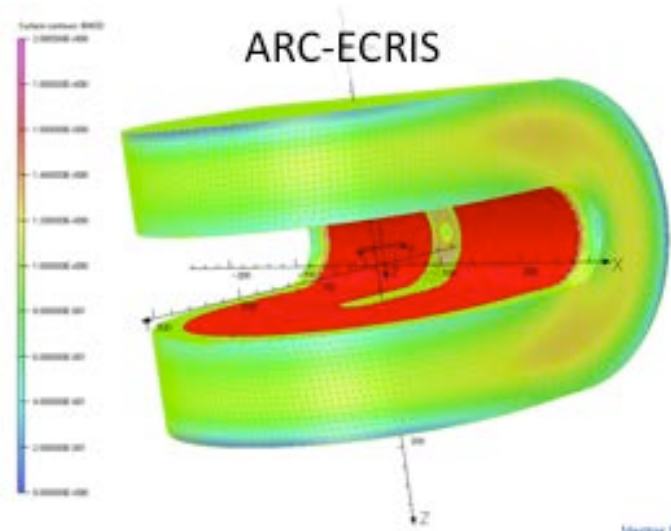
☐ Income of > 700.000 € a year



→ Commercial Services at JYFL-ACCLAB:
Winner of the National Academic Entrepreneurship Competition 2011

Accelerator technology

- ❑ New innovations for ion sources



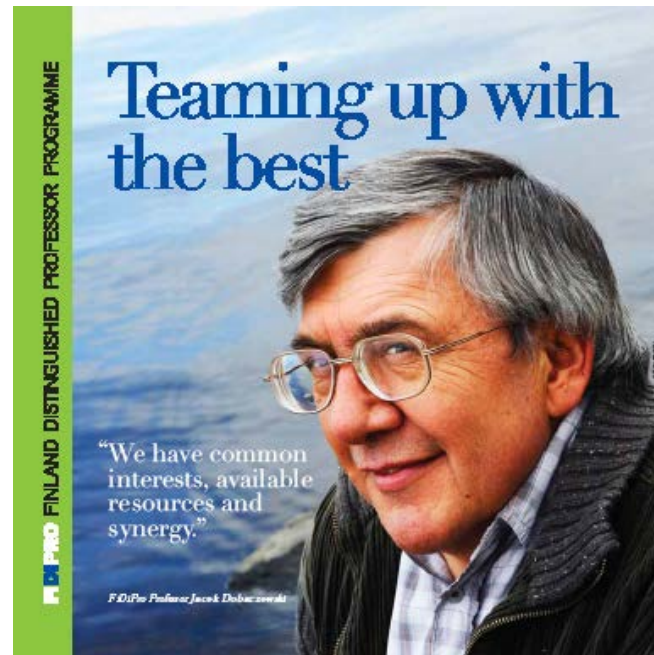
- ❑ Leading group in ECR ion source plasma studies
- ❑ New infrastructure funding available every year:
Application for a new ECR ion source

Researcher training

- ❑ 25 PhD's in 2008-2012
- ❑ 30 PhD's in other European universities –based on the research work at JYFL



New FiDiPro- contract for Jacek Dobaczewski 2013-2017



Respond to the challenge:

NuPECC 2010 LRP: *“European infrastructure facilities should integrate theory to a much higher degree*”

ENSAR

Thank You

