FEW WORDS ON THE AGATA PHYSICS CAMPAIGN

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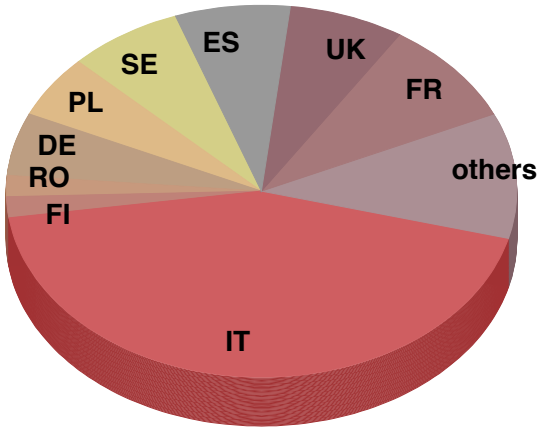
AGATA Collaboration Meeting, Legnaro, June 10, 2022

EXPERIMENTAL CONSTRAINTS FOR THE FIRST CAMPAIGN (2022)

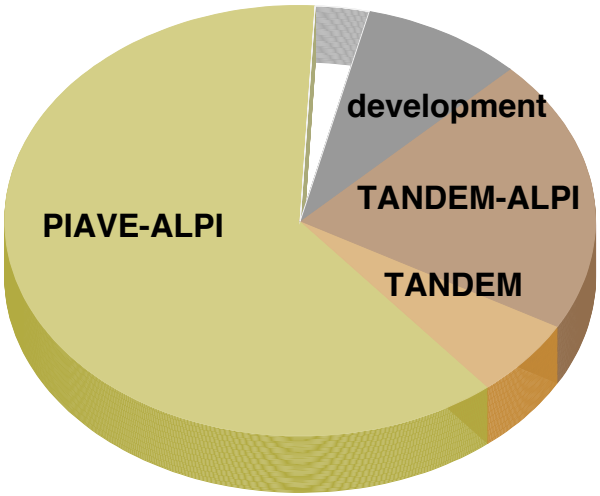
- stable beams from the Tandem-ALPI-PIAVE complex ancillaries compatible with PRISMA
- ready to run in 2022 (excludes projects that need long-term beam
- development or detectors used elsewhere in 2022 (e.g. PARIS))

- overwhelming response from the community: 34 LoIs presented at the first Pre-PAC Workshop (November 8-10, 2021)



- large majority (24) with at least one Italian spokesperson
- 9 out of 13 countries of the AGATA collaboration represented by LoI spokespersons
- co-spokespersons from Croatia, Belgium, Norway, US, Australia; 56 persons from 14 countries act as spokespersons

CONCLUSIONS OF THE PRE-PAC



- certain developments needed to achieve requested currents, energies, or deliver the requested element – not before 2023; some beams (Hg) not possible
- large majority of projects requested ALPI and/or PIAVE beams

- overlaps between certain projects (around ^{68}Ni, ^{208}Pb, ^{34}Si) – proponents strongly encouraged to collaborate
- no authorisation to use actinide targets (4 projects affected)

In total, about 300 days of beamtime requested

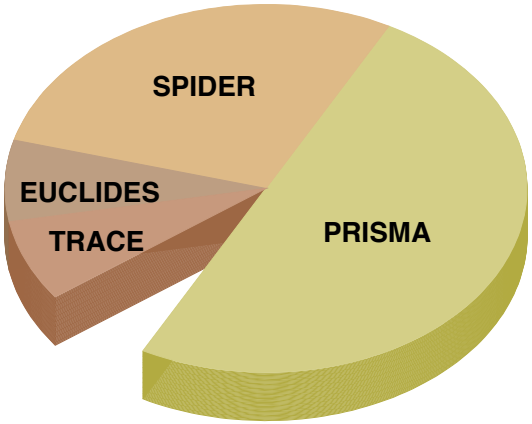
AFTER THE PRE-PAC MEETING

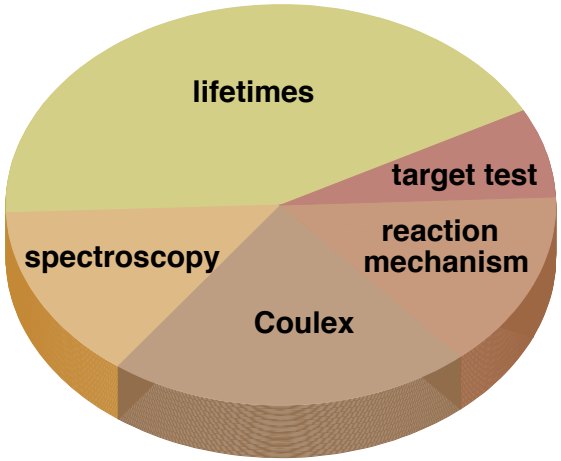
- call for proposals, December 11, 2021 – only TANDEM beams available before autumn 2022

⇒ we decide to authorise submission of proposals for AGATA with TANDEM beams, which have not been discussed at the Pre-PAC

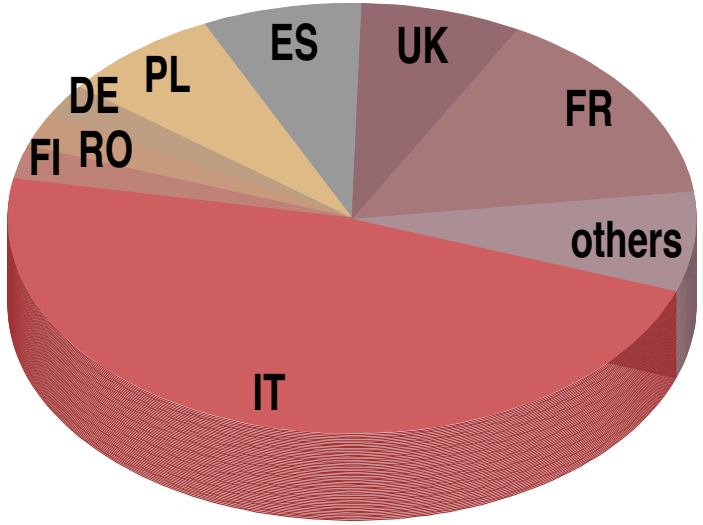
- 27 AGATA projects + commissioning proposed to the PAC, for a total of 227 days (151 TANDEM only, 137 involving ALPI and/or PIAVE)
- PAC meeting February 21 – 24, 2022:
  8 AGATA experiments + commissioning accepted with priority A,
  5 more with priority B
- TANDEM only: 45 days + 9, with ALPI and/or PIAVE: 38 days + 11

ACCEPTED PROPOSALS - STATISTICS

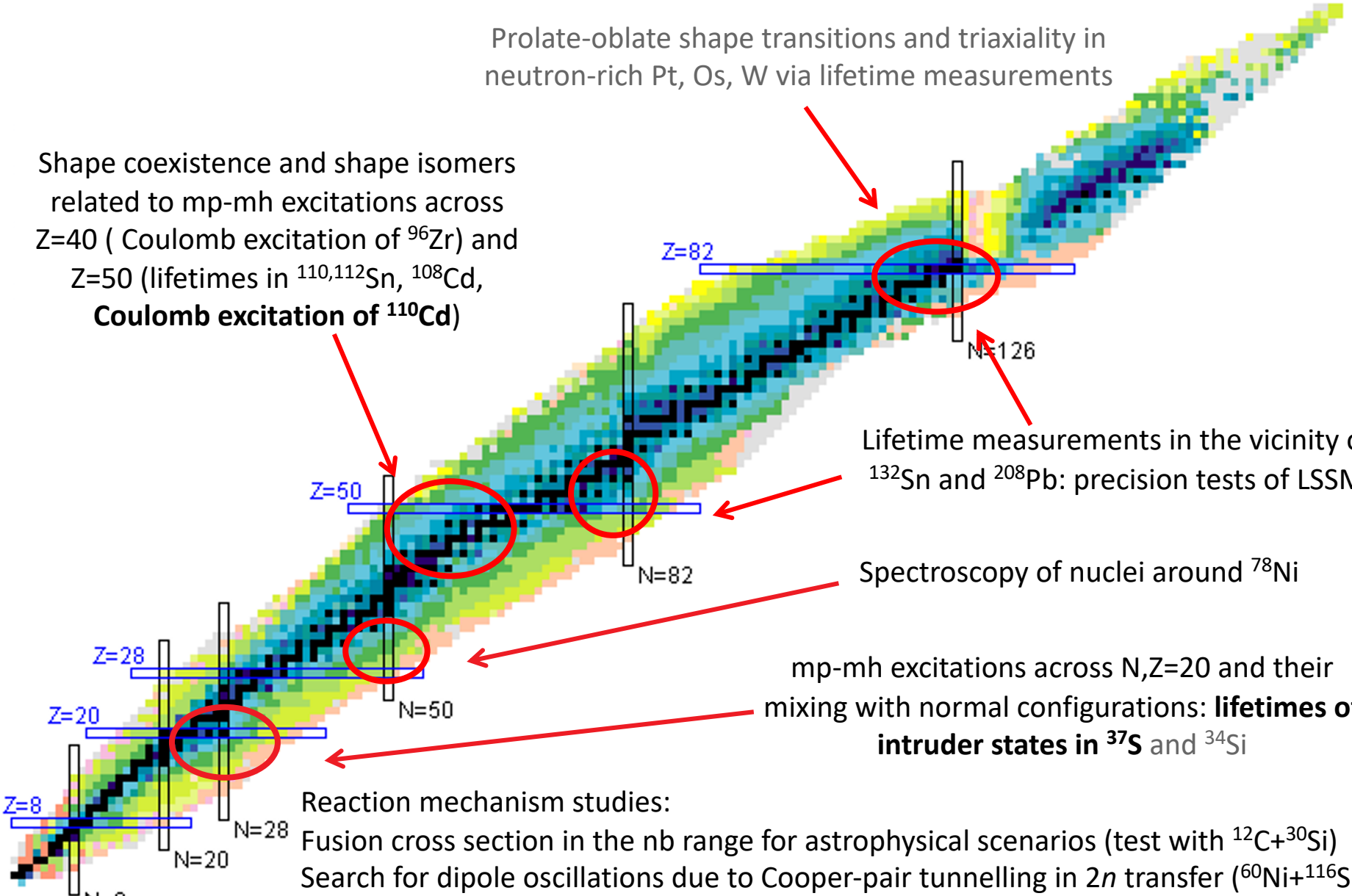




- 7 projects out of 14 require PRISMA
- lifetime measurements (RDDS, DSAM) dominate, but there is a fair share of other types of measurements
- spokespersons represent 8 out of 13 countries of the AGATA collaboration – similar distribution as in the LoI phase



PHYSICS CASES FOR THE FIRST CAMPAIGN



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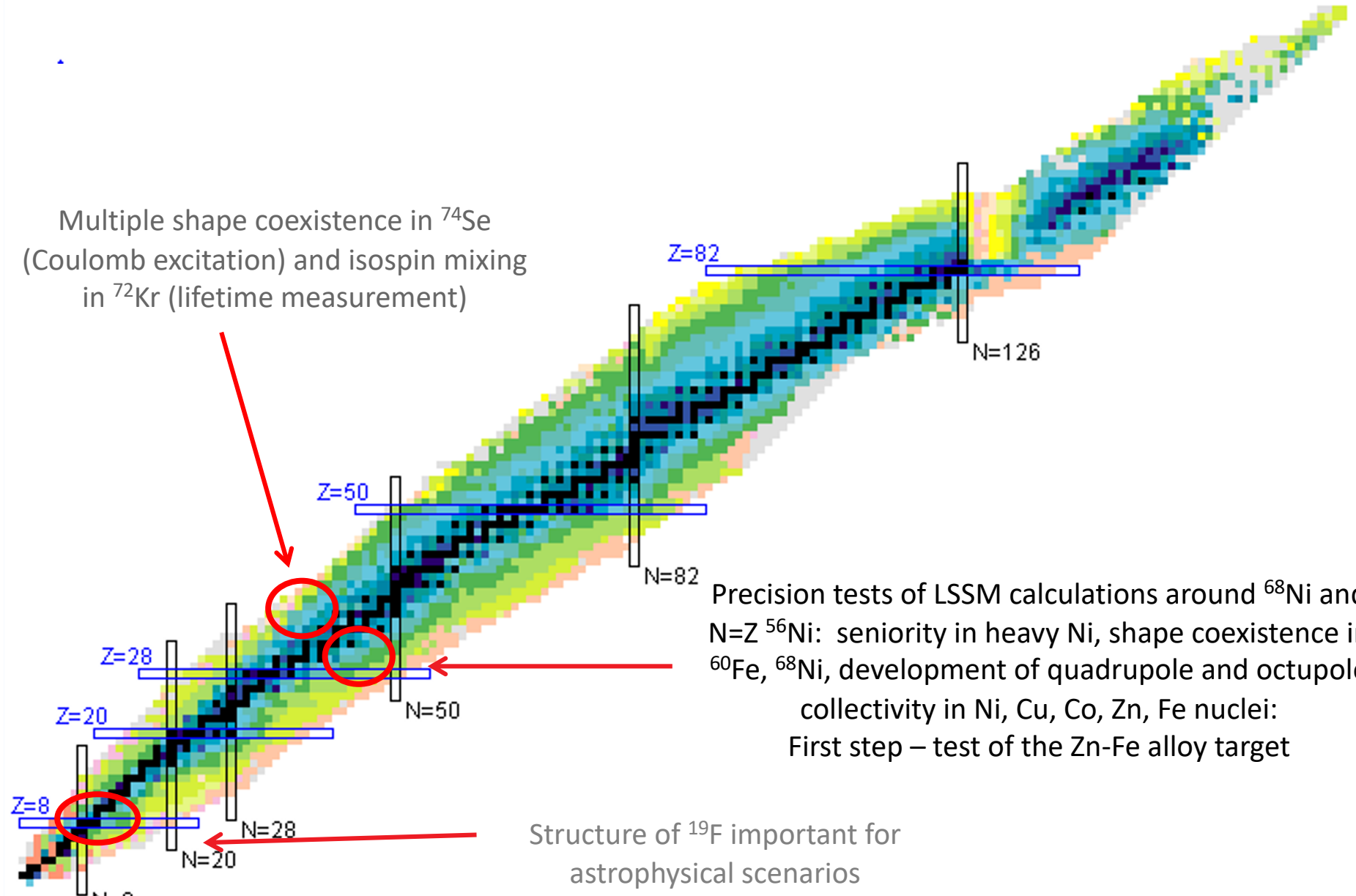


Multiple shape coexistence in ^{74}Se (Coulomb excitation) and isospin mixing in ^{72}Kr (lifetime measurement)

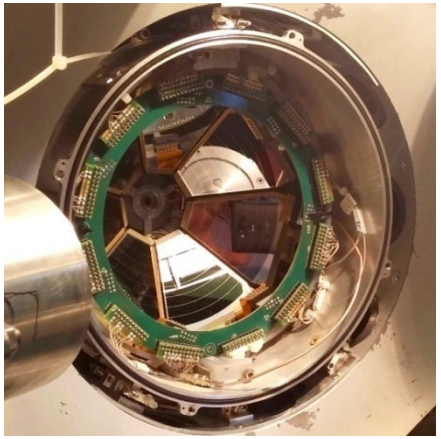
Precision tests of LSSM calculations around ^{68}Ni and N=Z ^{56}Ni: seniority in heavy Ni, shape coexistence in ^{60}Fe, ^{68}Ni, development of quadrupole and octupole collectivity in Ni, Cu, Co, Zn, Fe nuclei:
First step – test of the Zn-Fe alloy target

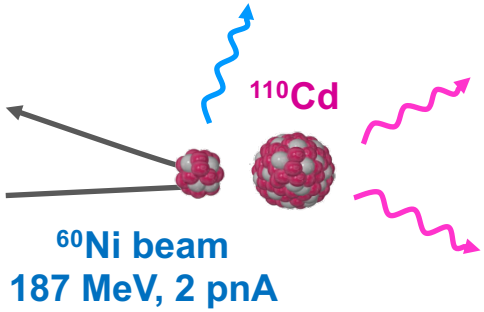
Structure of ^{19}F important for astrophysical scenarios

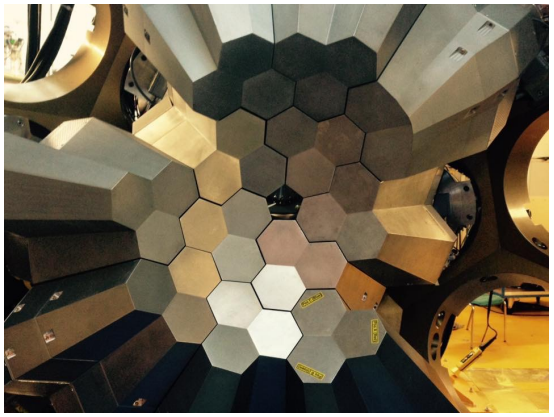
MULTIPLE SHAPE COEXISTENCE IN ^{110}CD

K. WRZOSEK-LIPSKA, P. GARRETT, A. NANNINI, M. ROCCHINI, MZ

Coulomb excitation of ^{110}Cd with AGATA + SPIDER

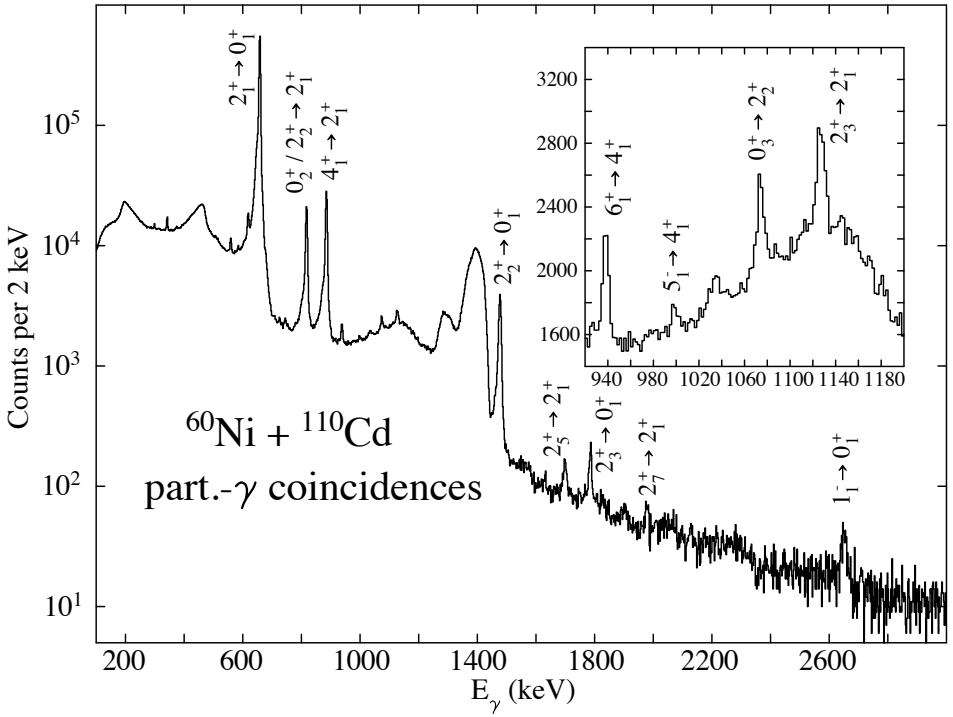






Measurement complementary to studies with lighter beams (^{32}S, ^{14}N) performed with EAGLE at HIL Warsaw

Data taking: June 3-5, 2022



CURRENT STATUS AND NEAR FUTURE

- Successful commissioning in April/May 2022
- May – July 2022 experiments with TANDEM
- October – December 2022 also with ALPI and PIAVE
- Next PAC: **December 5-7, 2022** (also ALPI and PIAVE), then spring 2023 (TANDEM only)
- 2nd Pre-PAC meeting: **October 5-7, 2022** (https://agenda.infn.it/event/31038/):
  - deadline for LoI submission: **September 21, 2022**
  - **all projects**, including those presented to the PAC in February 2022, should be presented at the Pre-PAC
  - hybrid (in person – online) form of the meeting

We are looking forward to exciting physics!

PRIORITY A EXPERIMENTS WITH AGATA

- Pathway to nuclear structure in heavy neutron rich nuclei in the vicinity of $N = 126$ and nuclei northwest of ^{132}Sn via multinucleon transfer reactions (P. Reiter) – 7 days
- Evolution of the mixing between single-particle and intruder configuratios approaching the island of inversion at $N = 20$ (F. Galtarossa, A. Gottardo) – 6 days
- Coexisting shapes and precision tests of Monte-Carlo Shell-Model calculations in ^{96}Zr (N. Marchini, D.T. Doherty, M. Zielińska) – 4 days
- Fusion-fission for γ-ray spectroscopy of neutron-rich nuclei around $N = 50$ (A. Gottardo, M. Caamaño, D. Ramos, J.J. Valiente-Dobón) – 14 days
- Search for a Josephson-like effect in the ^{116}Sn + ^{60}Ni system (L. Corradi, S. Szilner) – 14 days
- Probing multiple shape coexistence in ^{110}Cd with Coulomb excitation (M. Zielińska, K. Wrzosek-Lipska, A. Nannini, M. Rocchini, P. Garrett) – 5 days
- Understanding the nature of 0^+ states in ^{110,112}Sn and ^{108}Cd (N. Marginean, M. Ciemała, F. Crespi) – 12 days

PRIORITY A EXPERIMENTS WITH AGATA - TESTS AND COMMISSIONING

- Test of particle-γ coincidences with Agata+Euclides for studies of light-ion fusion at astrophysical energies (G. Montagnoli, A.M. Stefanini) – 3 days
- Test of the ^{70}Zn-^{64}Ni alloy target for nuclear structure studies in the vicinity of Z=28 neutron-rich isotopes with AGATA and PRISMA (R.M. Perez Vidal, S. Bottoni, E. Sahin, A. Illana, J. Benito, J. Ljungvall) – 3 days
- Commissioning of AGATA and complementary detectors at LNL (F. Crespi, F. Galtarossa, J. Pellumaj, M. Rocchini, M. Sedlak) – 15 days (split over 3 runs)
  - AGATA + PRISMA + DANTE
  - AGATA + SPIDER + DANTE
  - reverse Plunger

blue – TANDEM only (45 days + 9), red – needs ALPI and/or PIAVE (38 days + 11))

PRIORITY B EXPERIMENTS WITH AGATA

- Delineating the island of shape coexistence in $N \sim Z$ nuclei around A=70 through Coulomb excitation of ^{74}Se (W. Korten, K. Wrzosek-Lipska, E. Clément) – 5 days

- Establishing the properties of ^{19}Ne cluster states important for X-ray bursts (C. Wheldon, T. Kokalova) – 7 days

- Investigating the nature of the low-lying states of 196Os via lifetime measurements (D. Brugnara, J. Pellumaj, M. Sedlak) – 11 days

- Lifetime measurements for intruder states towards the island of inversion along the N=20 shell closure (I. Zanon, D. Brugnara) – 8 days

- Isospin mixing in the N=Z=36 ^{72}Kr: Lifetime measurement of the E1 isospin forbidden transitions (G. de Angelis, B. Rubio) – 12 days