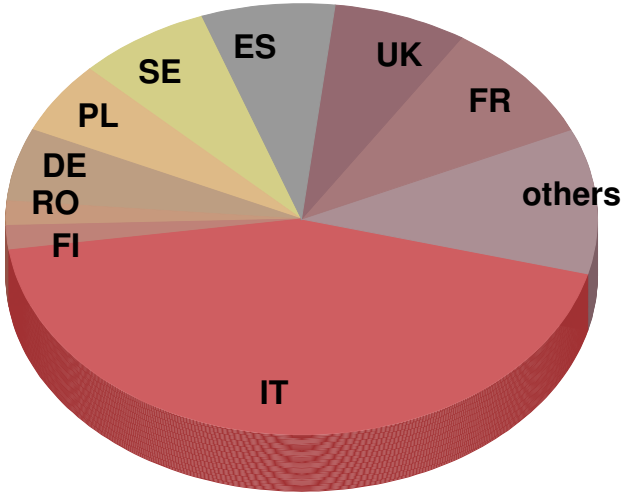
2022 AGATA physics campaign at LNL

Magda Zielińska

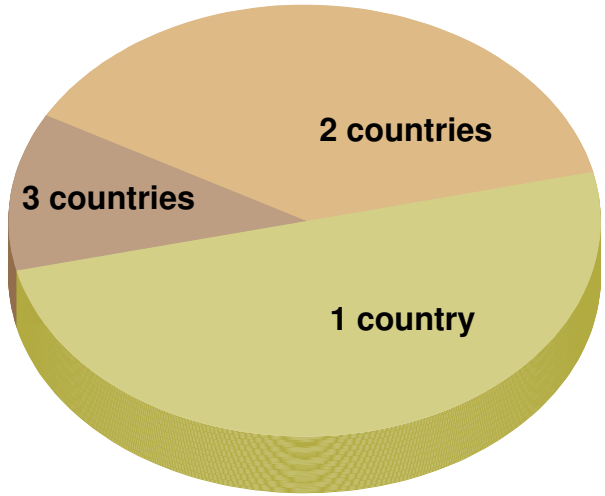
Pre-PAC Workshop: November 8–10, 2021

- overwhelming response from the community: 34 LoIs submitted



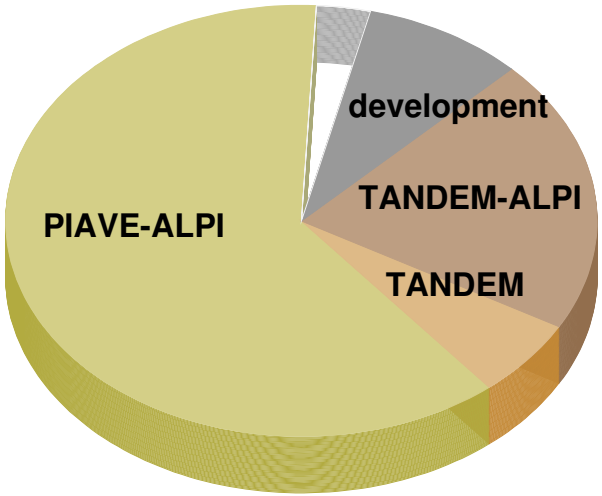
- large majority (24) with at least one Italian spokesperson
- 9 out of 13 countries of the AGATA collaboration represented by LoI spokespersons
- co-spokespersons from Croatia, Belgium, Norway, US, Australia

- 56 persons from 14 countries act as spokespersons



Experimental constraints for the first campaign

- 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))



- 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

- in total, about 300 days of beamtime requested

After the Pre-PAC meeting

• overlaps between certain projects (around ^{68}Ni, around ^{208}Pb, ^{34}Si) – proponents strongly encouraged to collaborate

• no authorisation to use actinide targets (4 projects affected)

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

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

• 27 AGATA projects + commissionning 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 + commissionning accepted with priority A, 5 more with priority B

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 configurations 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. Zielinska) – 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. Zielinska, 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 commissionning

• 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

- Lifetimes in the ^{196}Os region populated with multinucleon transfer reactions (D. Brugnara, J. Pellumaj, M. Sedlak) – 11 days

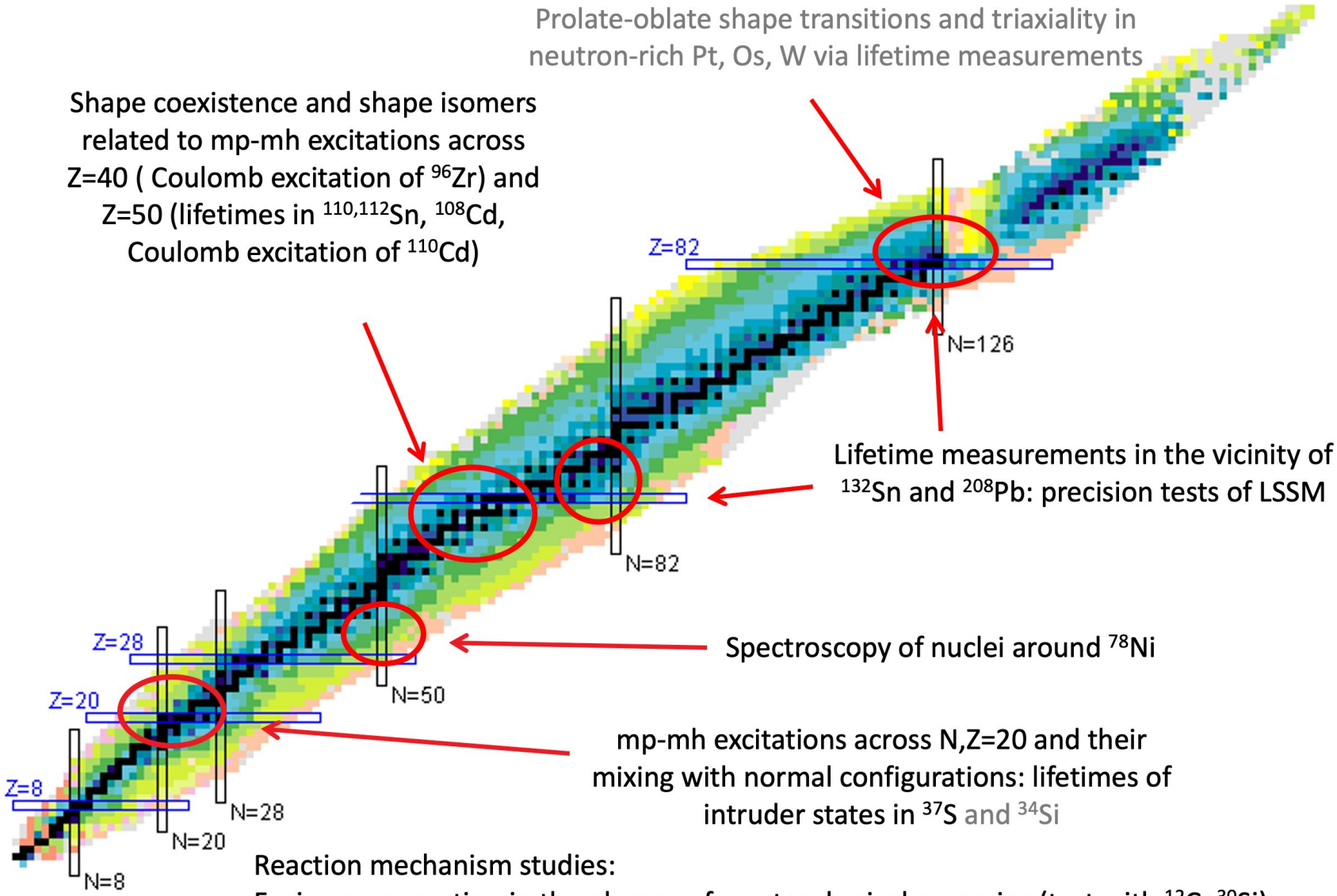
- Lifetime measurements for intruder states towards the island of inversion along the N=20 shell closure (I. Zanon, D. Brugnara) – 8 days

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

Physics cases for the first AGATA campaign

Prolate-oblate shape transitions and triaxiality in neutron-rich Pt, Os, W via lifetime measurements

Shape coexistence and shape isomers related to mp-mh excitations across Z=40 (Coulomb excitation of ^{96}Zr) and Z=50 (lifetimes in ^{110,112}Sn, ^{108}Cd, Coulomb excitation of ^{110}Cd)



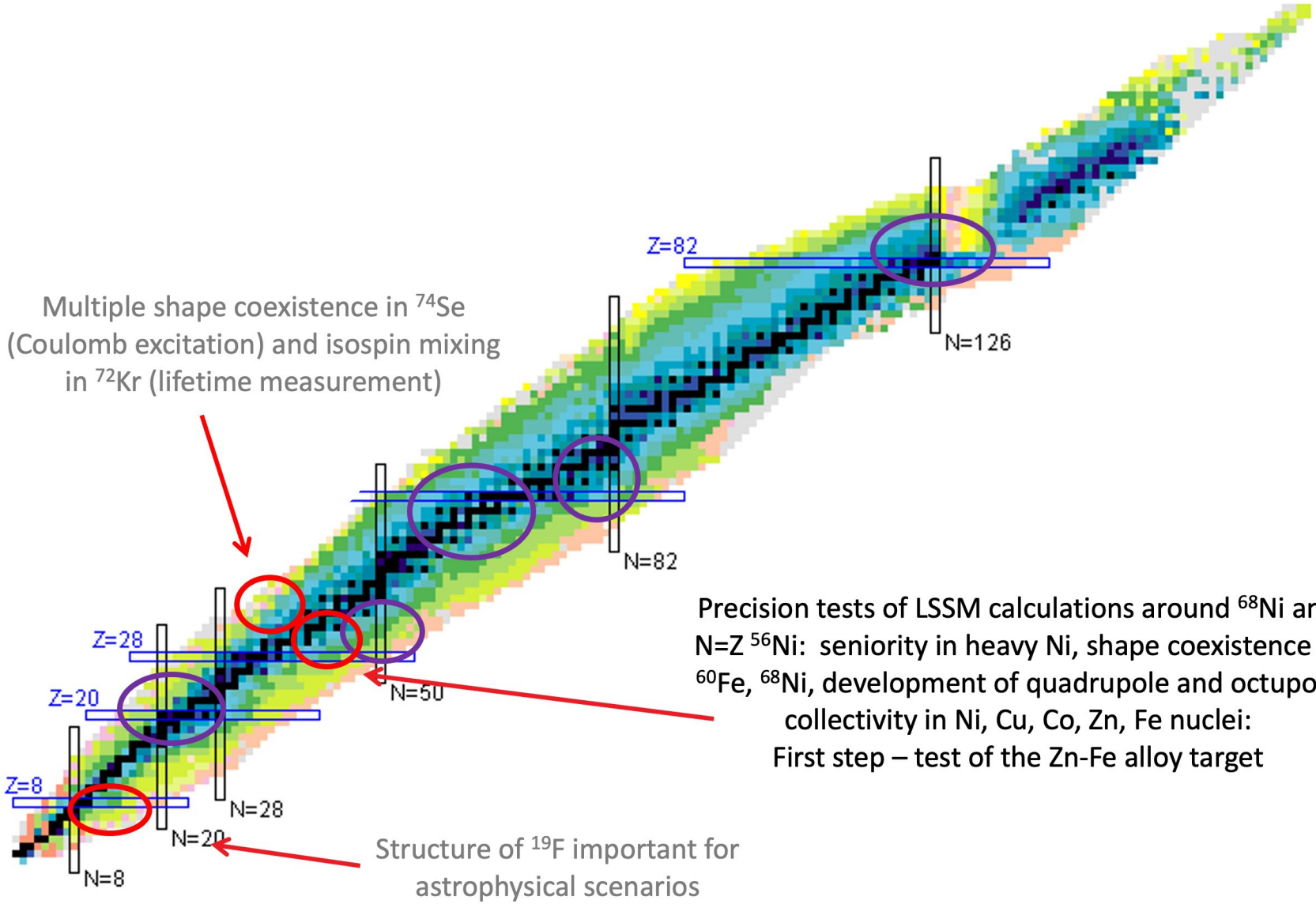
Lifetime measurements in the vicinity of ^{132}Sn and ^{208}Pb: precision tests of LSSM

Spectroscopy of nuclei around ^{78}Ni

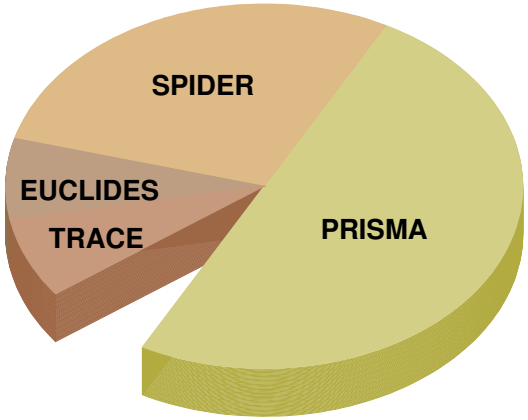
mp-mh excitations across N,Z=20 and their mixing with normal configurations: lifetimes of intruder states in ^{37}S and ^{34}Si

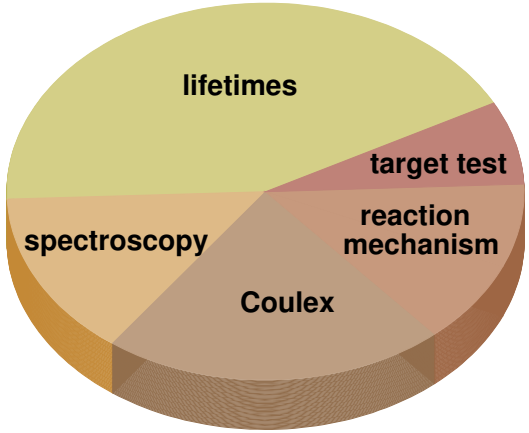
Reaction mechanism studies:
Fusion cross section in the nb range for astrophysical scenarios (test with ^{12}C+^{30}Si)
Search for dipole oscillations due to Cooper-pair tunnelling in 2*n* transfer (^{60}Ni+^{116}Sn)

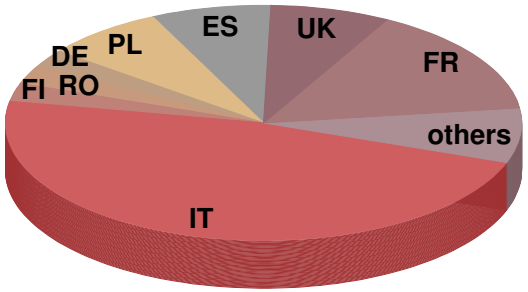
Physics cases for the first AGATA campaign



Accepted proposals – statistics (priority A+B)







- 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

We are looking forward to an exciting physics campaign!