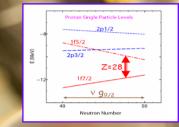
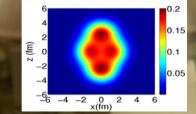
The AGATA Campaign at GANIL

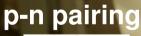
Silvia M. Lenzi University of Padova and INFN

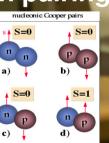
Shell evolution far from stability

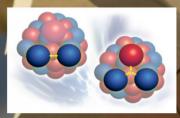


clusterization







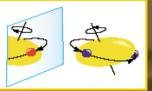


Three-body forces

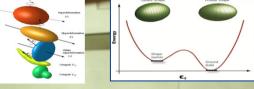
High-resolution gamma-ray spectroscopy is an optimum tool to study nuclear structure properties and investigate how they emerge from fundamental interactions.

Isospin symmetry

breaking



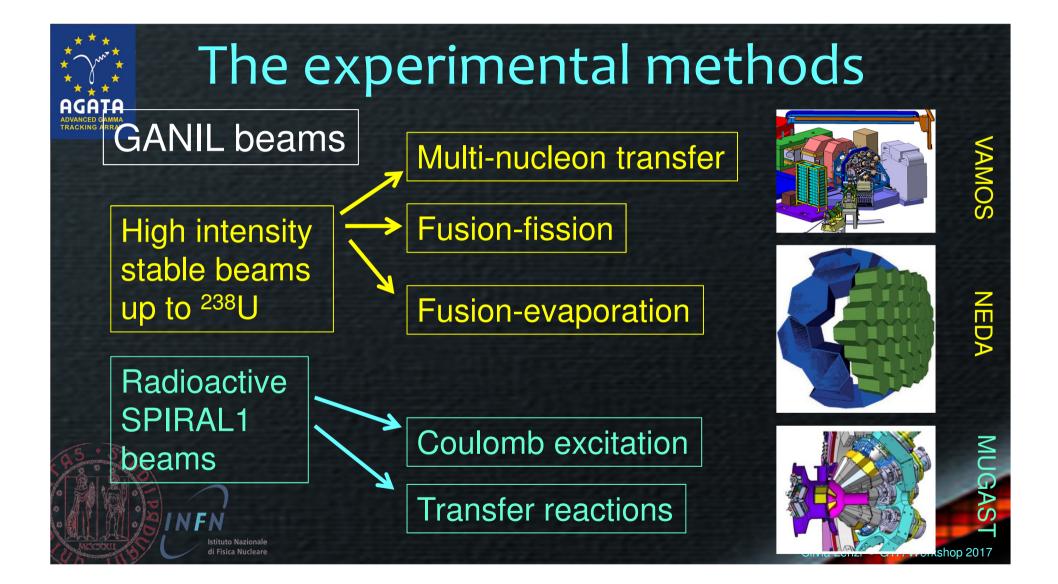
Nuclear shapes and coexistence



Super heavy elements



Nuclear Astrophysics Coupling to the continuum





AGATA Physics Campaign in GANIL

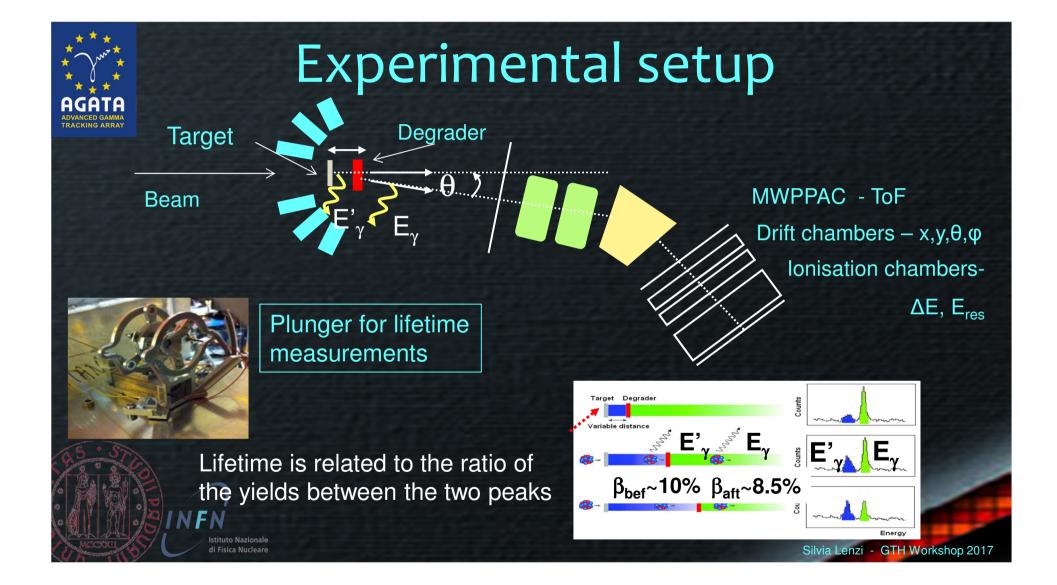
The Campaign has been organized in a bottom-up approach following calls for LoI, discussed in dedicated annual collaboration workshops.

Four main setups (campaigns) have been identified:

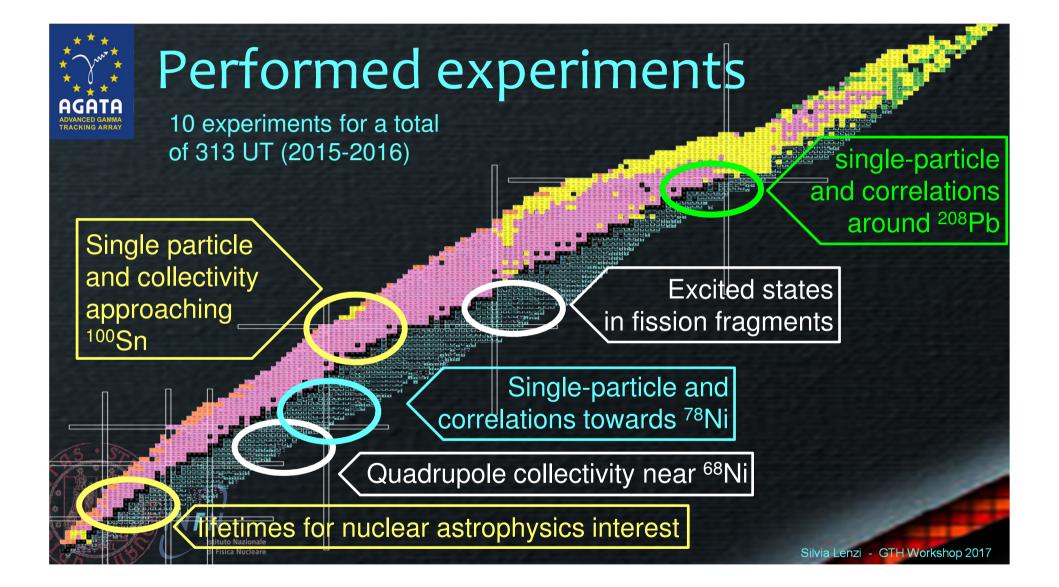
VAMOS (vacuum)
NEDA-N-Wall + DIAMANT
MUGAST (SPIRAL1 beams)
VAMOS (gas-filled)

Sivia Lenzi - GTH Workshop 2017

First Campaign AGATA+VAMOS





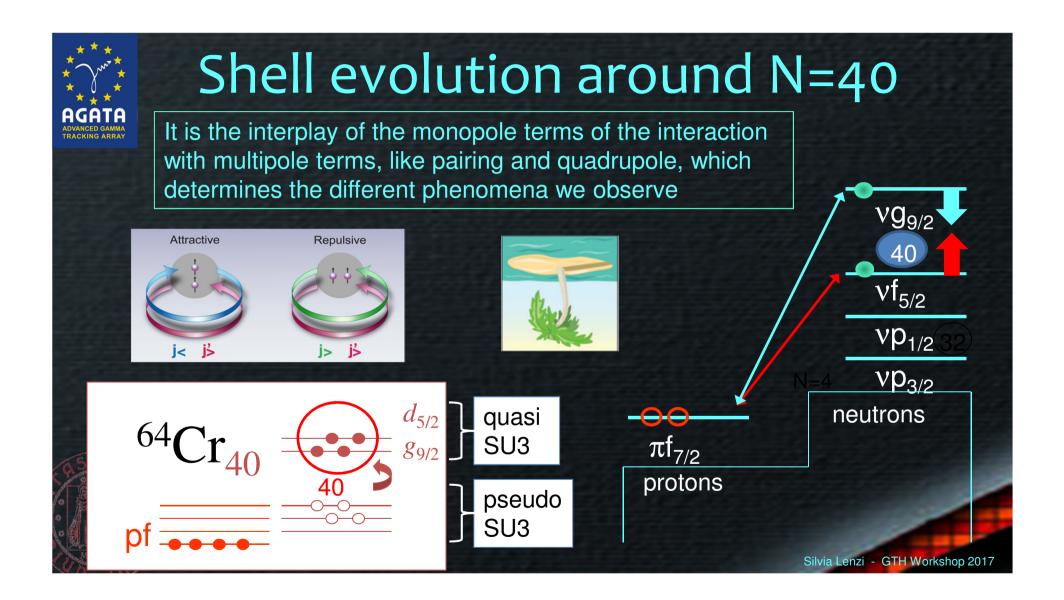




Some selected results

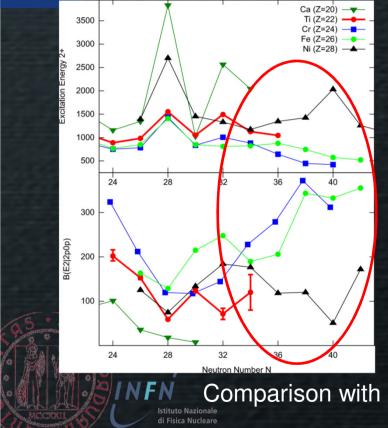
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Shell evolution around Z=28, N=40

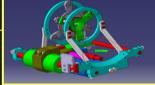




Lifetimes near N=40



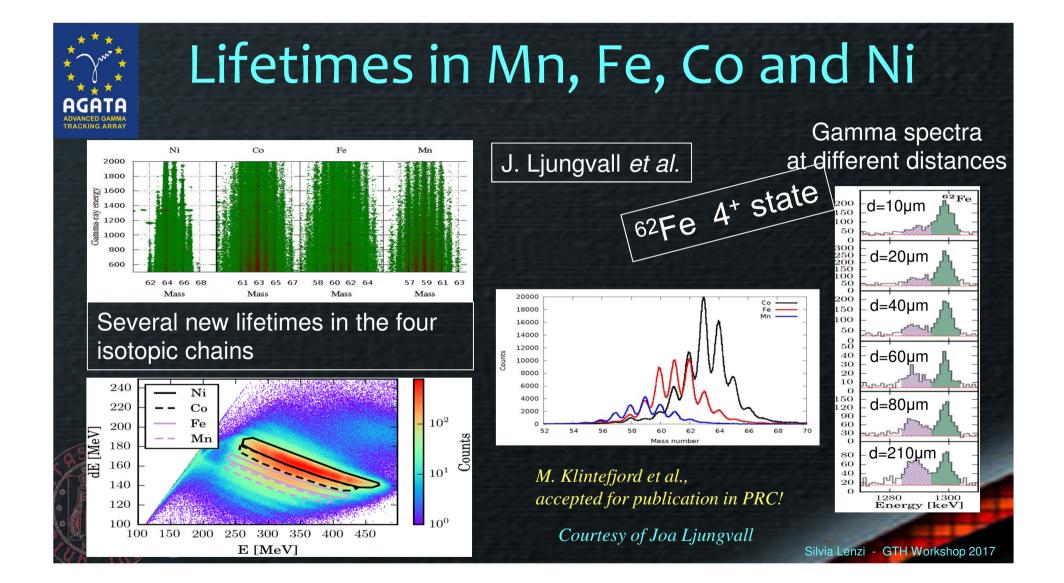
Motivation: understanding the development and the trend of deformation in the third island of inversion.



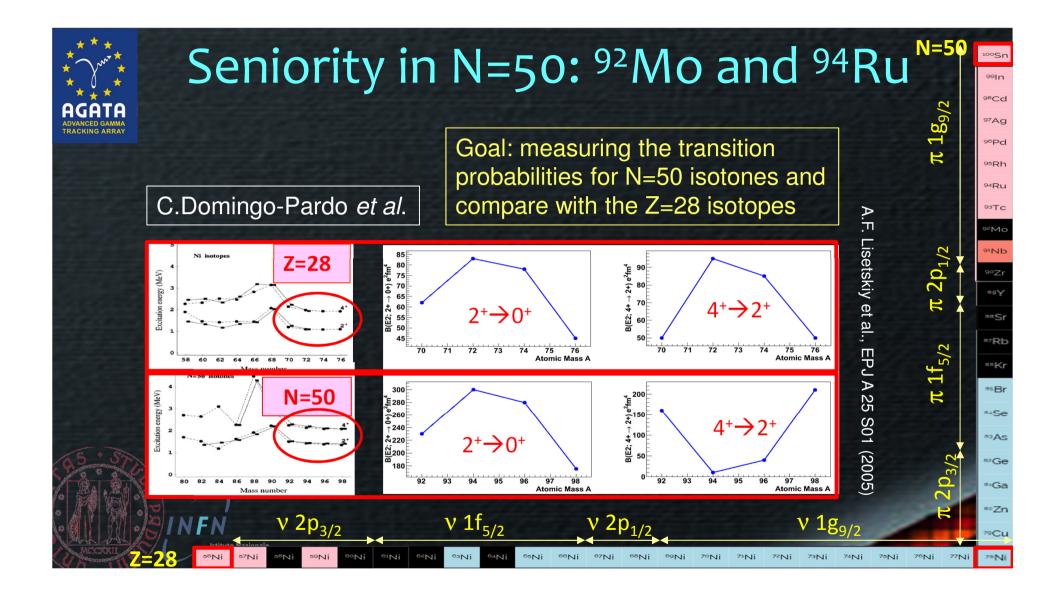
Scarce information on transition probabilities and lifetimes of J>2 states in Cr and Fe

Several nuclei of interest in the region: Ti, Co (shape coexistence), Mn no information on lifetimes so far

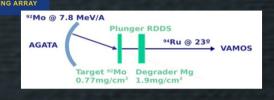
Comparison with LSSM calculations in the fpgd model space



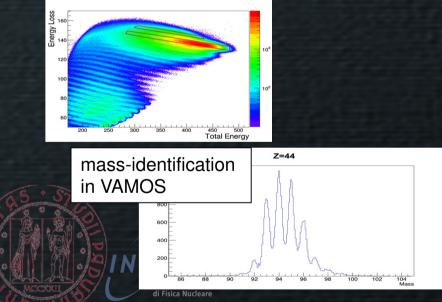
Single-particle and correlations near closed shells





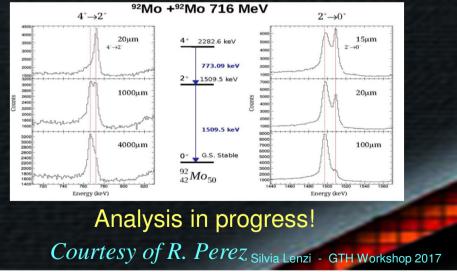


Z-identification in VAMOS



Lifetimes have been obtained for the $2^+ \rightarrow 0^+$ and $4^+ \rightarrow 2^+$ transitions in ⁹²Mo and ⁹⁴Ru

Online spectra for ⁹²Mo



Structure properties of neutron-rich nuclei at N~50



Test of Z=28, N=50 gaps in ⁸⁰Zn and ⁸²Ge

G. Duchene et al

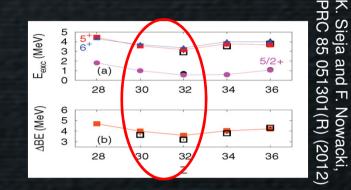
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di Fisica Nucleare

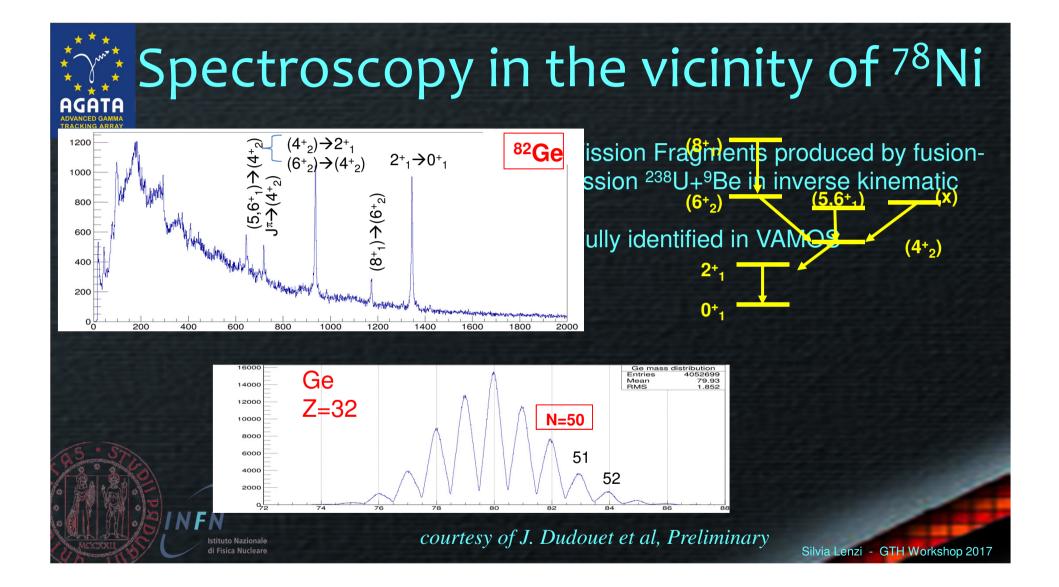
The quenching of the N=50 gap towards ⁷⁸Ni can be investigated looking at the excitation energy of high-spin states involving particle-hole excitations across the N=50 gap

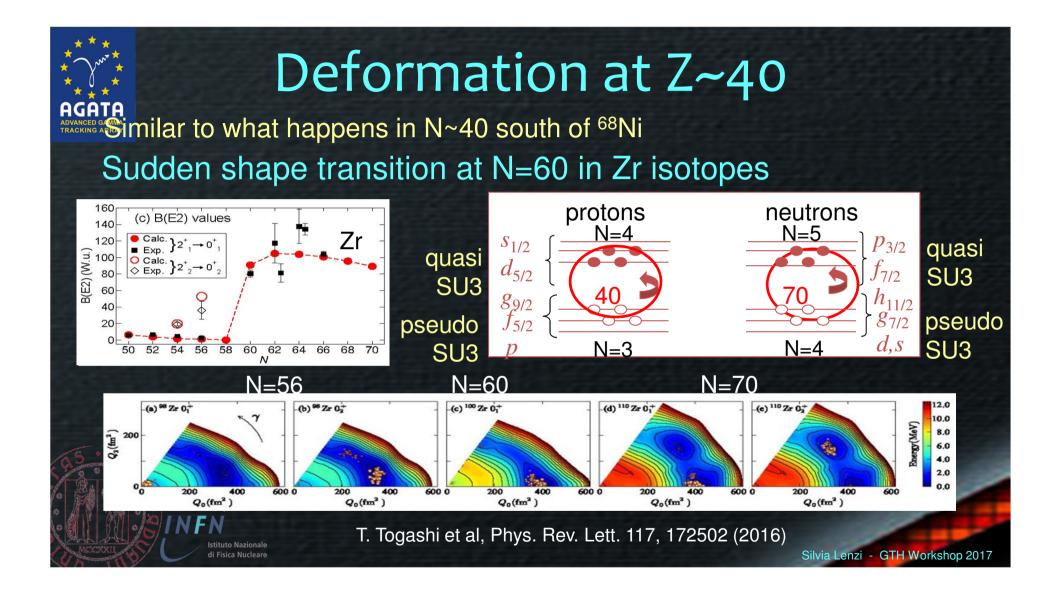
> LSSM calculations predict an increase of excitation energy towards ⁷⁸Ni

Goal: measuring the excitation energy of high spin states: 5,6,7⁺ in ⁸⁰Zn and ⁸²Ge



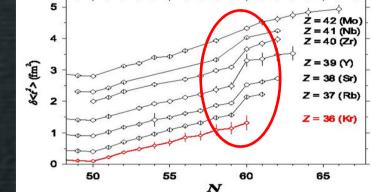






Timits of the Island of Inversion at N=60 AGATA

Difference in mean-square charge radii at N~60

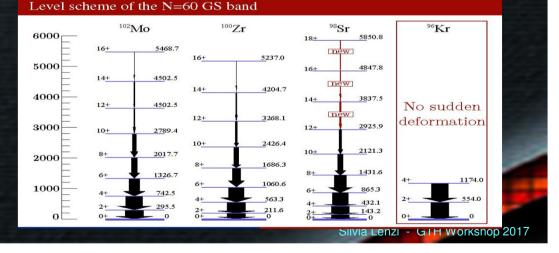


S. Naimi et al., PRL 105, 032502 (2010)

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Charge radii suggest that Kr (Z=36) lies outside the Island of inversion.

This has been recently confirmed by an experiment performed with AGATA at GANIL: J. Dudouet et al, to be submitted to PRL



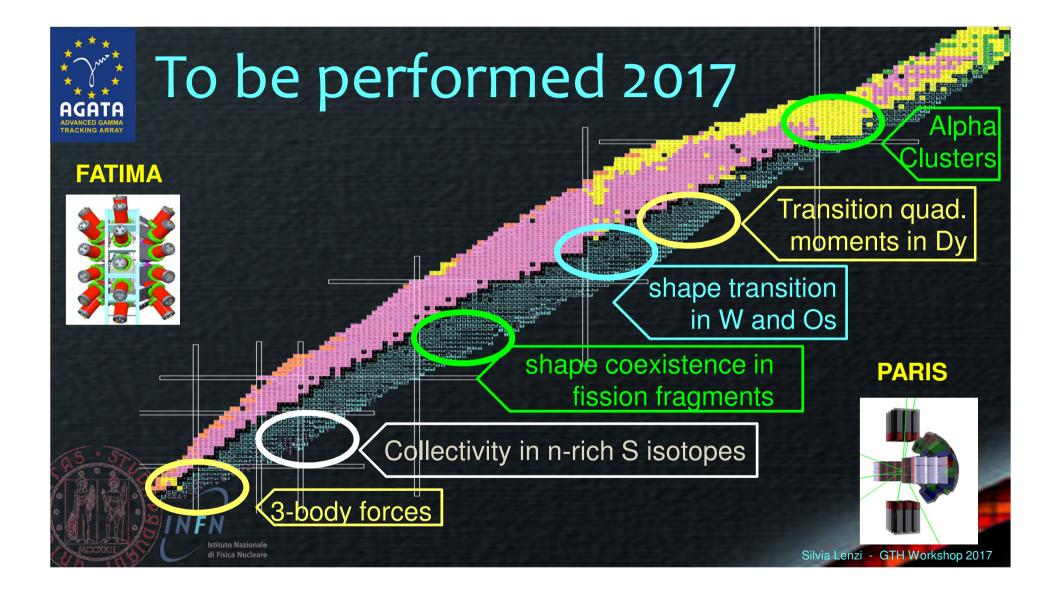


Hands-on week for data analysis

A hands-on week for data analysis was organized last October in GANIL by E. Clement and A. Lemasson where the different techniques and codes for AGATA, VAMOS and the plunger were illustrated.

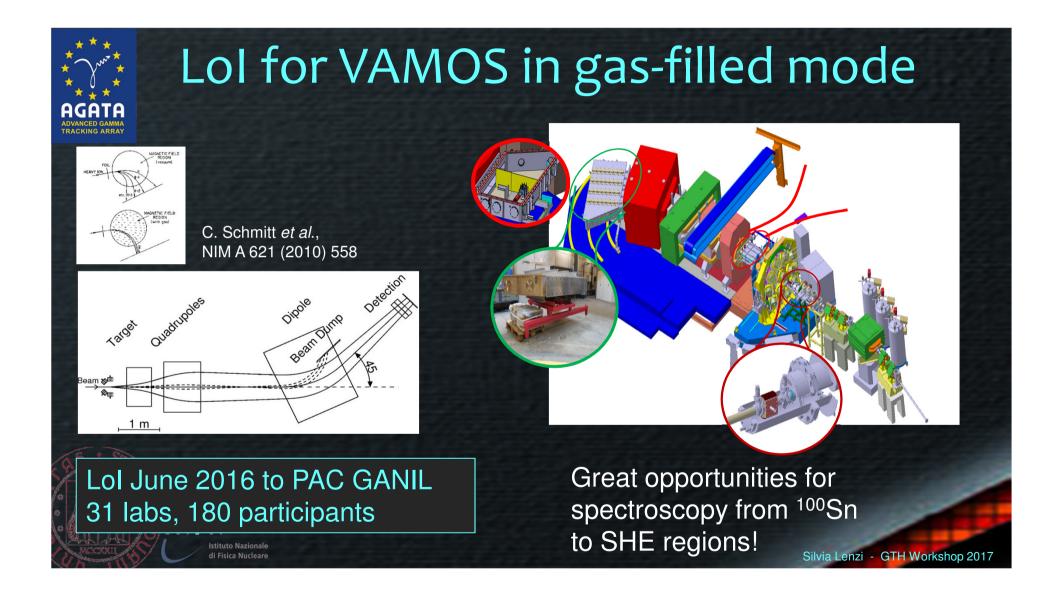
The spokesperson and/or the colleagues involved in the analysis of the performed experiment participated to this training course which was very much appreciated.

A new school is foreseen in the framework of NUSPIN for the data analysis of the next AGATA campaign



Future campaigns





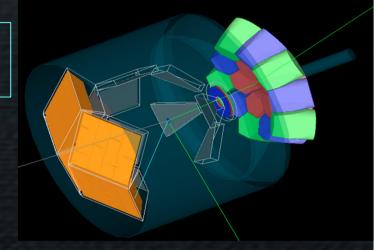


Lol for MUGAST + VAMOS

Si array for reaction and structure studies with radioactive beams from SPIRAL1

The LoI propose to study:

Nuclear Astrophysics: spectroscopic factors of relevant resonances for nucleosynthesis studies in radiative capture reactions: (6LI,d), (3He,d), (d,p)



Shell evolution: spectroscopic factors, s.p. energies (d,p), (t,p), p-n pairing, clusterization



Organization of the campaign

2018

The GANIL PAC has approved 7 experiments in priority A and 2 in priority B compatible with the AGATA+NEDA+Diamant setup for a total of 187 (230) UT

2019-2020?

Both campaigns have been presented at the NUSPIN Workshop to the AGATA Collaboration Council, who has give the support to both the MUGAST and VAMOS gfm campaigns

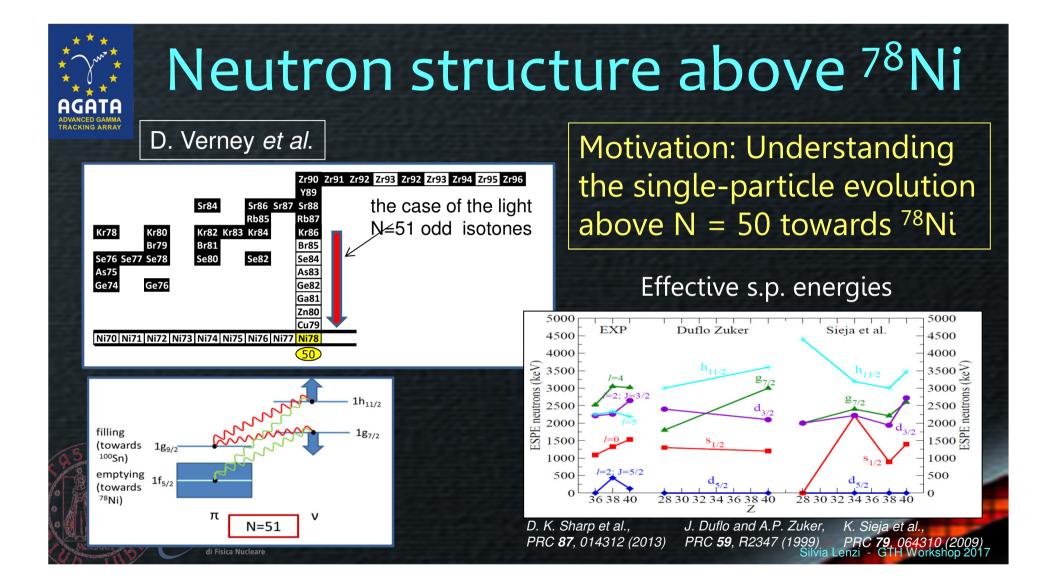
Together with Emmanuel Clement, we have presented a report to the GANIL Scientific Council suggesting the opportunity of prolonging the campaign until 2020 in order to be able to organize the two campaigns. The GANIL SC supports our suggestion.

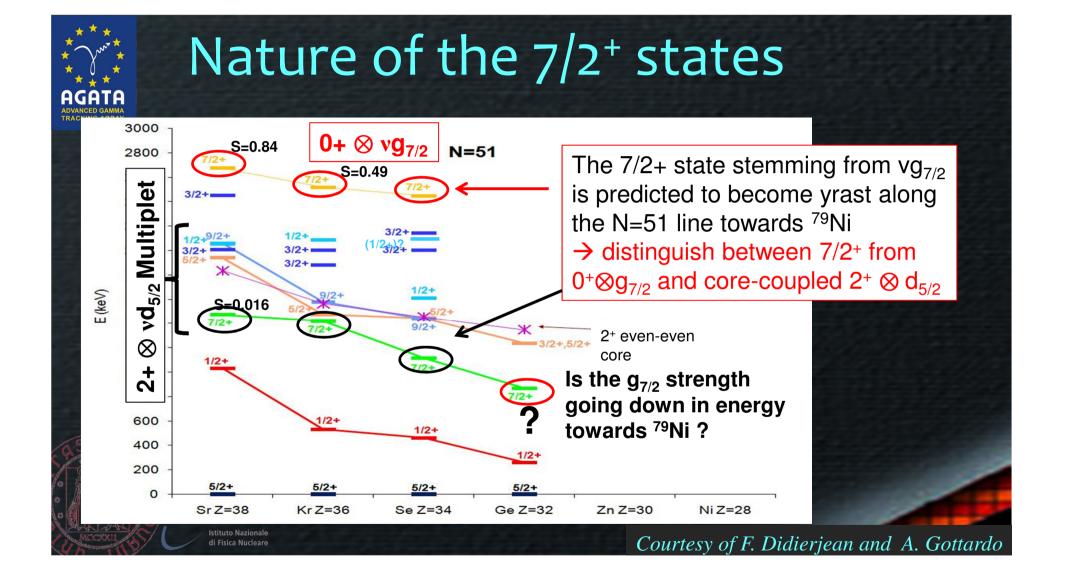
A discussion with the new GANIL Director is foreseen in February

Thanks to the AGATA Collaboration, the Management Board leaded by A. Gadea and specially to the GANIL team leaded by the project manager Emmanuel Clément

ryour attention

ha





Lifetime measurements in N=51

It is relatively easy to distinguish the 2 configurations by lifetime measurements :

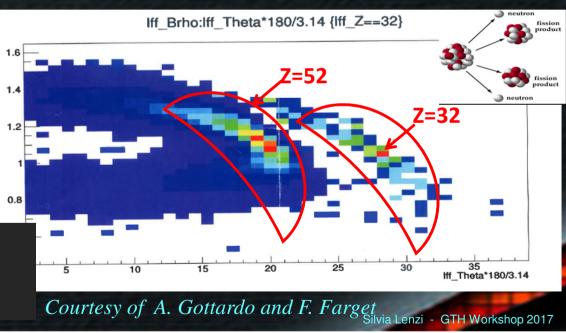
 $\begin{array}{ll} [{\bf 2}^{+\otimes} \ {\bf d}_{{\bf 5}/{\bf 2}}] \ {\bf 7}/{\bf 2}_{1} & {\mbox{ short lived}} \\ [{\bf 0}^{+}^{\otimes} \ {\bf g}_{{\bf 7}/{\bf 2}}] \ {\bf 7}/{\bf 2}_{1} & {\mbox{ long lived}} \end{array}$

fff_Brho

Fusion-fission reaction ²³⁸U+⁹Be

Magnetic spectrometer placed at large angle to select the lowest mass region. UNIQUE opportunity at GANIL!

Lifetime in ⁸³Ge and other nuclei in the region can be obtained. Analysis in progress!

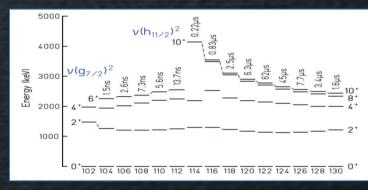


2 orders of magnitude difference



Towards ¹⁰⁰Sn: B(E2)'s in ^{106,108}Sn

J.J.Valiente-Dobon et al.



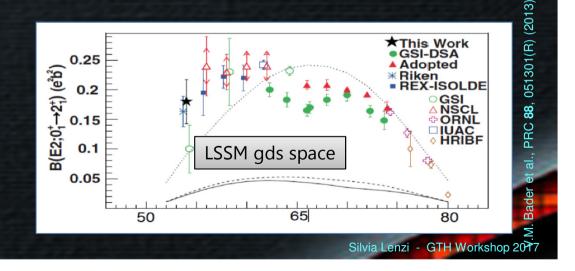
GOAL: Measuring the lifetime of the 2⁺ states with less than 5% error to constrain the models.

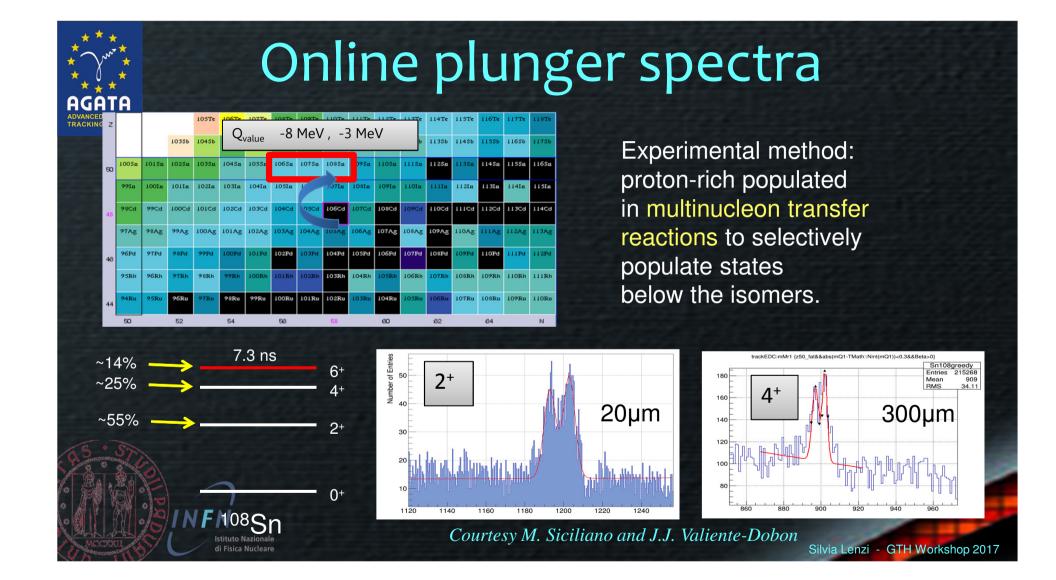
First lifetime measurement with plunger device in this region

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The behaviour of the B(E2:0+ \rightarrow 2+) depart from the parabolic behaviour expected from SM calculations in the truncated gds space.







23811

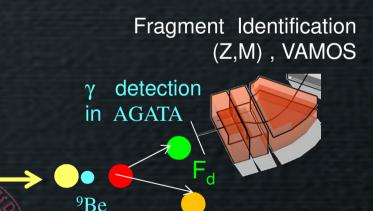
Spectroscopy of fission fragments

A. Navin, M. Rejmund et al.

Target

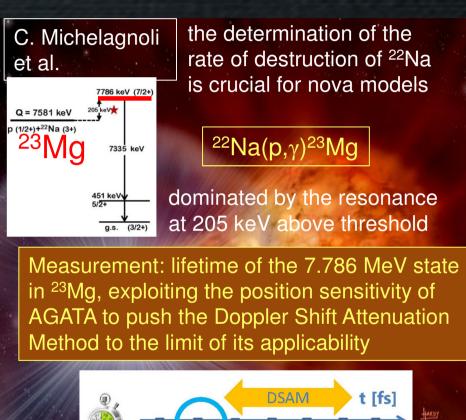
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Goal: high-spin and isospin spectroscopy. Structure of nuclei around ¹³²Sn



 F_{c}

Nuclear Astrophysics



10-

 $10^2 \ 10^3$

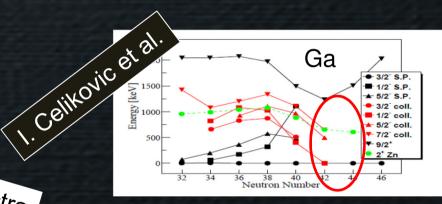
104 105

Below and above Z=28

Lifetimes in ⁵⁶Ti and ⁵⁵V

Shape evolution: subshell closures and development of deformation

Lifetime in Ga and Zn



lifetime of the 5/2- state in ⁷³Ga decaying to a "degenerate" g.s
 mapping collectivity changes towards N=50

Courtesy of Christoph Fransen and Igor Celikovic