

TANDEM–ALPI ACCELERATOR

Intruder configurations toward the Island of Inversion at $N=20$

Experimental Setup: AGATA + PRISMA.

Spokesperson(s): K. Wimmer, S. Bottoni, G. Benzoni, P. Aguilera, F. Recchia

K. Wimmer¹, S. Bottoni², G. Benzoni², P. Aguilera³, F. Recchia⁴,
S.M. Lenzi⁴, S. Carollo⁴, R. Menegazzo⁴, D. Mengoni⁴, S. Pigliapoco⁴,
K. Rezyrkina⁴, G. Andreetta⁵, F. Angelini⁵, D. Bazzacco⁵,
G. de Angelis⁵, F. Galtarossa⁵, A. Goasduff⁵, B. Gongora⁵, A. Gottardo⁵,
T. Marchi⁵, D.R. Napoli⁵, J. Pellumaj⁵, E. Pilotto⁵, D. Stramaccioni⁵,
L. Zago⁵, A. Gadea⁶, J.J. Valiente-Dobón⁶, R.M. Perez-Vidal⁶, F.
Galtarossa⁴, L. Corradi⁵, E. Fioretto⁵, A. Stefanini⁵, M. Del Fabbro⁵, G.
Montagnoli², F. Scarlassara¹, J. Diklic⁶, T. Mijatovic⁶, and S. Szilner⁶

¹ *GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany*

² *INFN sez. Milano and Dipartimento di Fisica, Università degli Studi di Milano, Milano, Italy*

³ *CEFEN, Comisión Chilena de Energía Nuclear, Santiago, Italy*

⁴ *INFN sez. Padova and Dipartimento di Fisica, Università degli Studi di Padova, Padova, Italy*

⁵ *INFN, Laboratori Nazionali di Legnaro, Legnaro, Italy*

⁶ *Instituto de Física Corpuscular, CSIC, Valencia, Spain*

⁶ *Ruder Bošković Institute, Zagreb, Croatia.*

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Abstract

We propose a new experiment at LNL using the AGATA+PRISMA setup to investigate the structure of neutron-rich magnesium isotopes near the $N=20$ Island of Inversion. Using a ^{30}Si beam on a ^{238}U target, we aim to populate ^{30}Mg and neighboring nuclei via multinucleon transfer reactions and measure level lifetimes using the Doppler Shift Attenuation Method. The experiment focuses on the evolution of intruder configurations and configuration mixing in even-even and odd-A systems, particularly probing the nature of the 2_2^+ in ^{30}Mg and negative-parity states in ^{29}Mg . Lifetimes, transition strengths, and spectroscopic information will provide key constraints on shell-model and ab initio

calculations, and clarify the onset of collectivity and shape coexistence in this critical region. The results will contribute to a more systematic understanding of structure evolution across isotopic chains approaching the Island of Inversion.

Summary of technical data

Run	Ion	Energy (MeV)	Current (pnA)	Target	Setup / beamline	Days
1	30Si	220	2	238U	AGATA + PRISMA	10+1