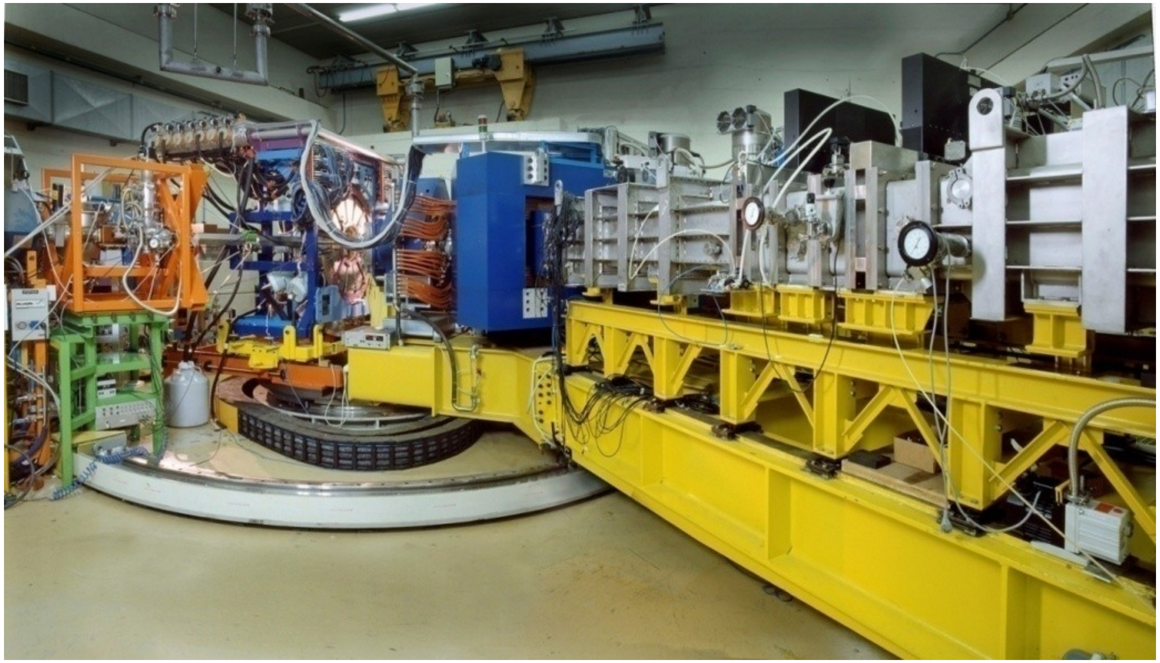
The PRISMA magnetic spectrometer: present status and ongoing upgrades

F. Galtarossa for the PRISMA collaboration
INFN – Laboratori Nazionali di Legnaro

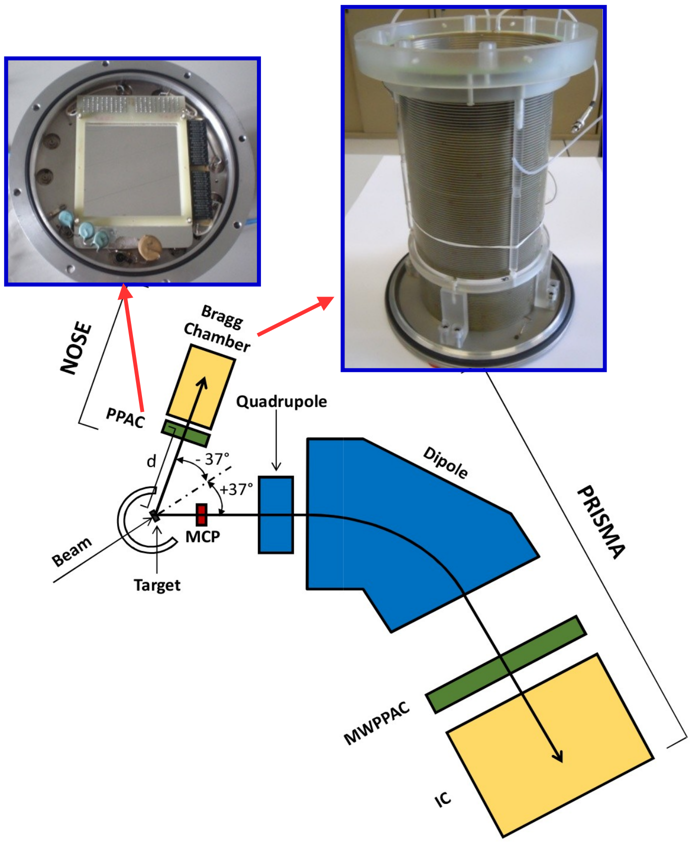


LNL Annual User Meeting

21 November 2017

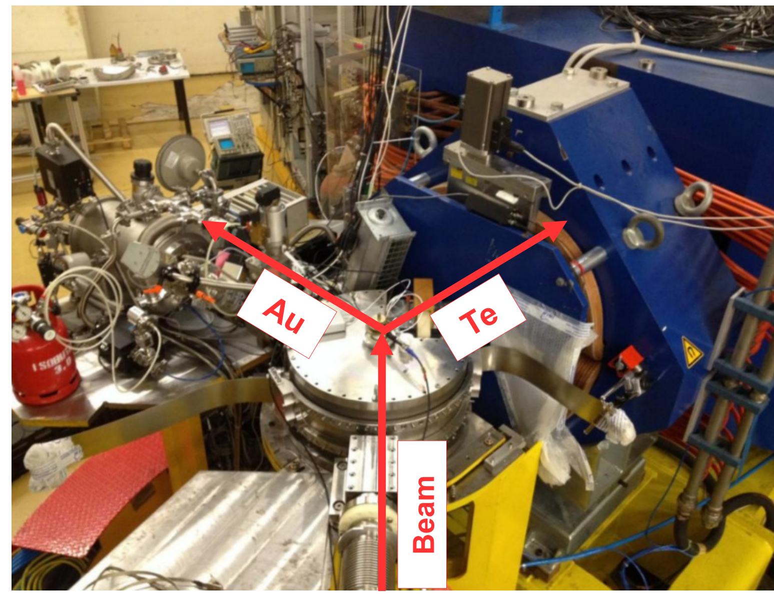
Recent upgrades: the second arm

A MWPPAC followed by a Bragg chamber in kinematic coincidence with PRISMA.



E. Fioretto et al., submitted to Nucl. Instr. and Meth. A

^{197}Au+^{130}Te @ 1.07 GeV in inverse kinematics. PRISMA coupled to the second arm to study the behavior of the heavy partner.

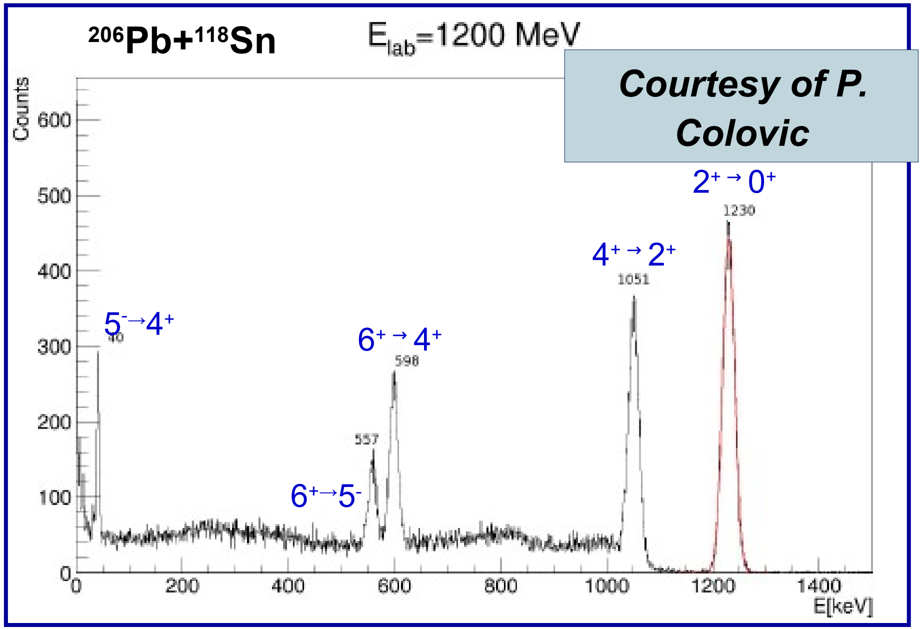


F. Galtarossa et al., submitted to Phys. Rev. C

Recent upgrades: a γ array based on $LaBr_3$:Ce scintillators

The array consists of six 2"x2" $LaBr_3$ scintillators with PM readout. Each scintillator is placed at 7 cm from the target and tilted by 45° with respect to the reaction plane, achieving a photopeak efficiency of about 1.3% for 1.33-MeV γ rays.

Timing and energy resolutions of **450 ps** and **30 keV** for 1.33-MeV γ rays.

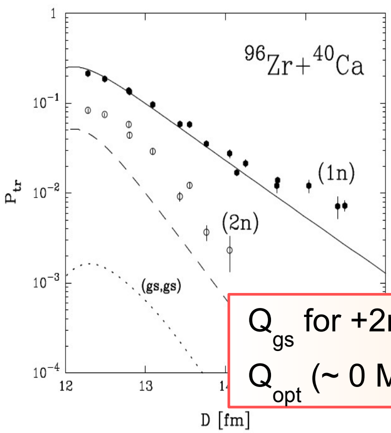


Simulated γ-spectrum of ^{118}Sn for the ^{206}Pb+^{118}Sn reaction at E_{lab}=1200 MeV obtained with GEANT4 package.

Experiments in backlog: $^{206}Pb+^{118}Sn$ in inverse kinematics

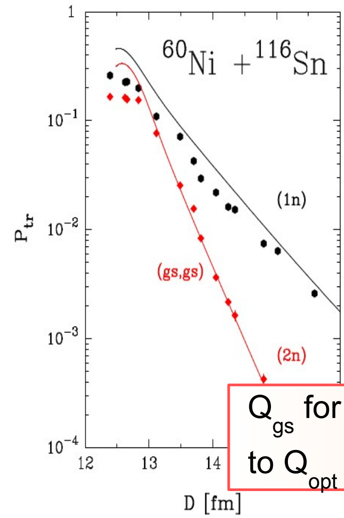
Probing nucleon-nucleon pairing correlations in the $^{206}Pb+^{118}Sn$ transfer reaction at far sub-barrier energy with the Pb beam delivered by the PIAVE-ALPI accelerator complex in an energy range E_{lab} = 950-1200 MeV.

L. Corradi and S. Szilner, LNL PAC 2015



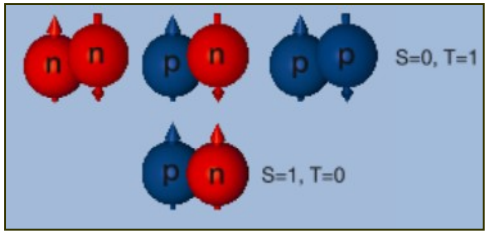
Q_{gs} for +2n far from Q_{opt} (~ 0 MeV)

L. Corradi et al., Phys. Rev. C **84** 034603 (2011)



Q_{gs} for +2n very close to Q_{opt} (~ 0 MeV)

D. Montanari et al., Phys. Rev. Lett. **113** 052501 (2014)



The experiment was accepted by the PAC in 2015 and scheduled for the period May-June 2016 but then postponed due to problems occurred to the PIAVE injector

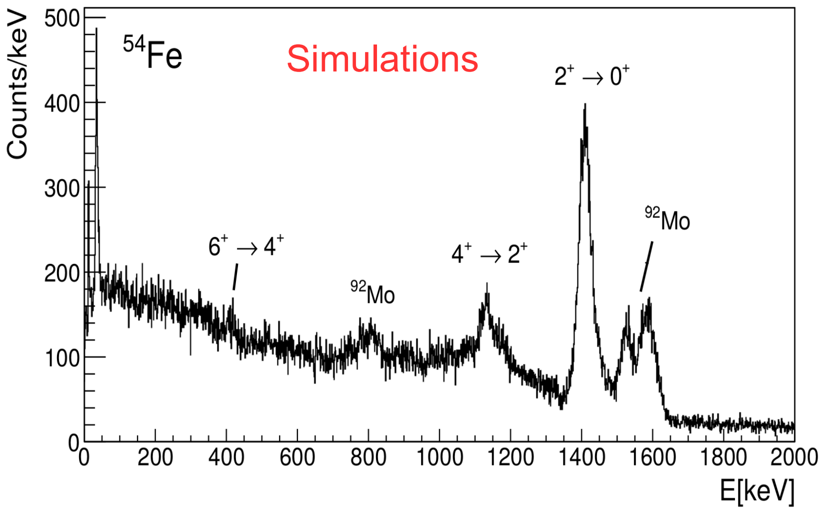
Experiments in backlog: $^{54}Fe + ^{92}Mo$ at E_{lab} = 230 MeV

Nucleon-nucleon correlations in $^{54}Fe + ^{92}Mo$ probed via γ-particle coincidences

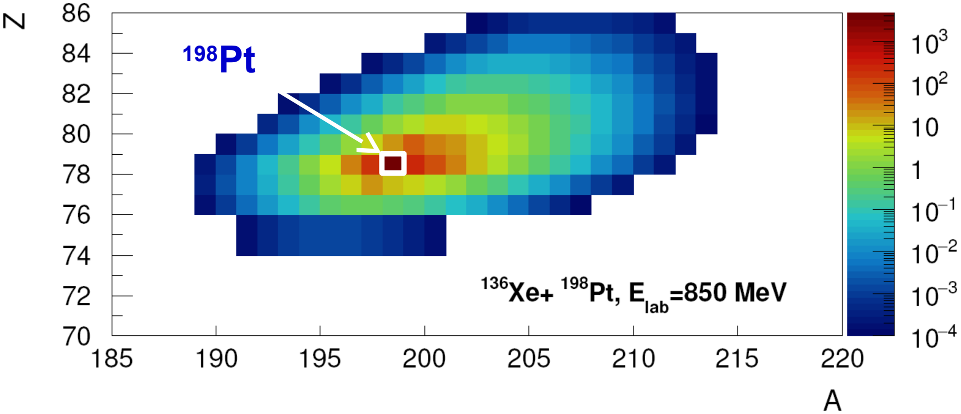
T. Mijatović and F. Galtarossa, LNL PAC 2017

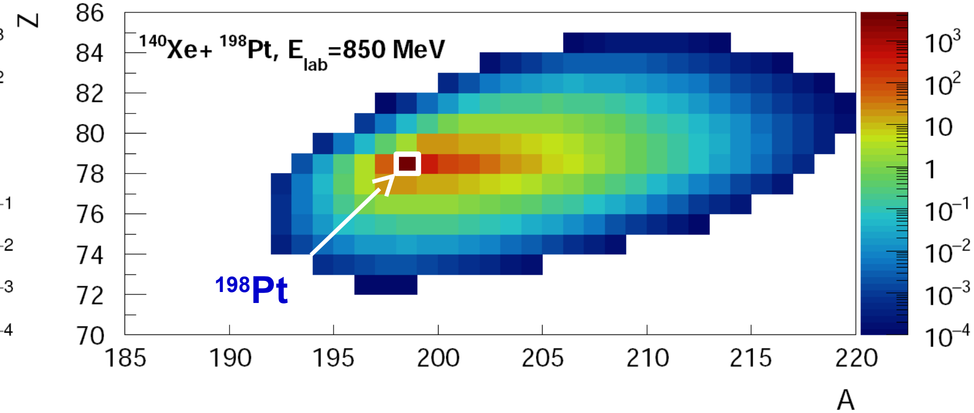
The experiment was accepted by the PAC in January 2017 and scheduled for the period June-July 2017 but then postponed due to problems occurred to the TANDEM

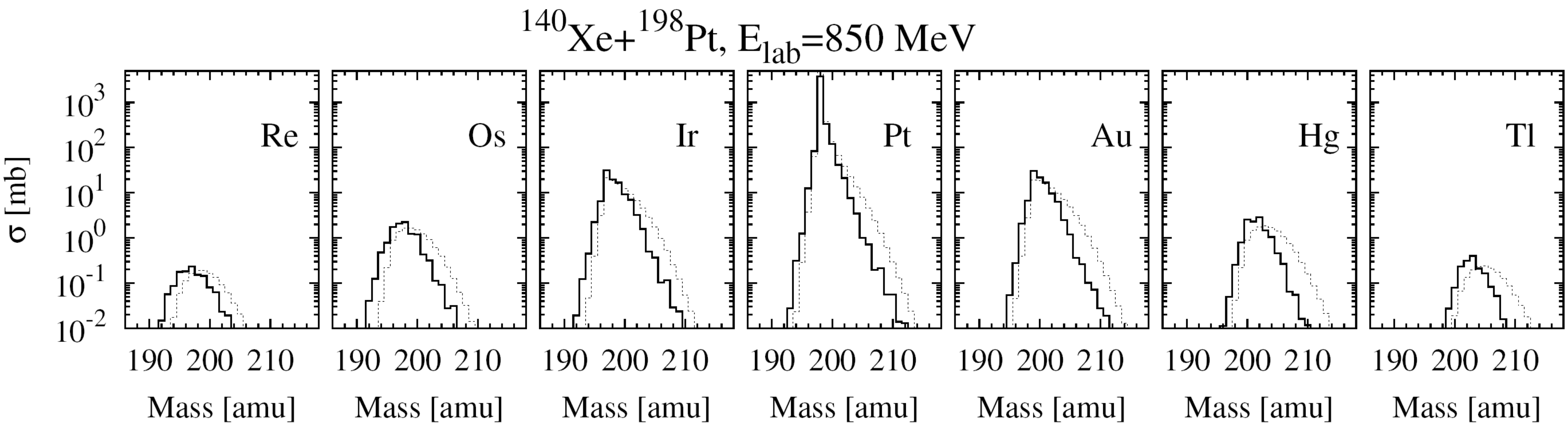
PRISMA coupled to the $LaBr_3$:Ce array to measure the strength of the ground-to-ground-state transfer



LoI for SPES: population of neutron-rich heavy nuclei



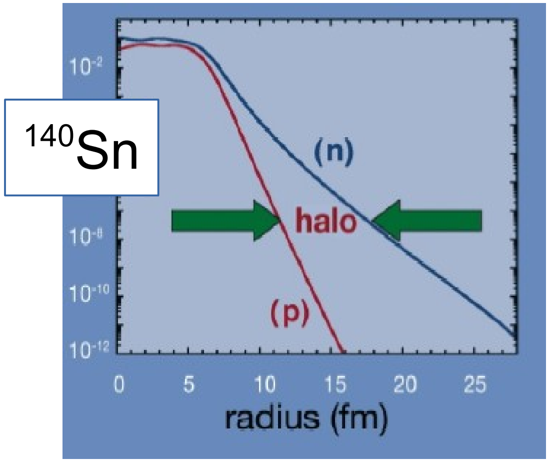




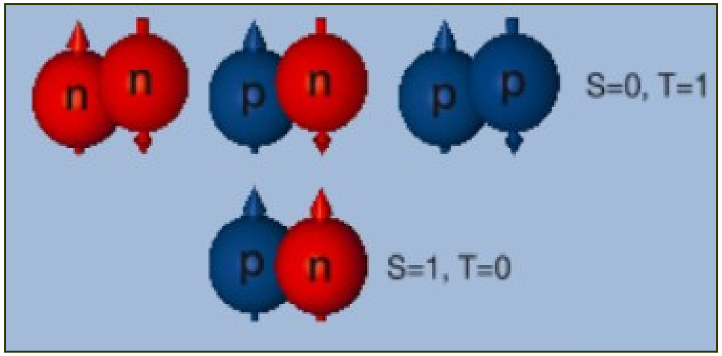
E. Fioretto, Third International SPES Workshop, October 2016

LoI for SPES: pairing in transfer with neutron-rich nuclei

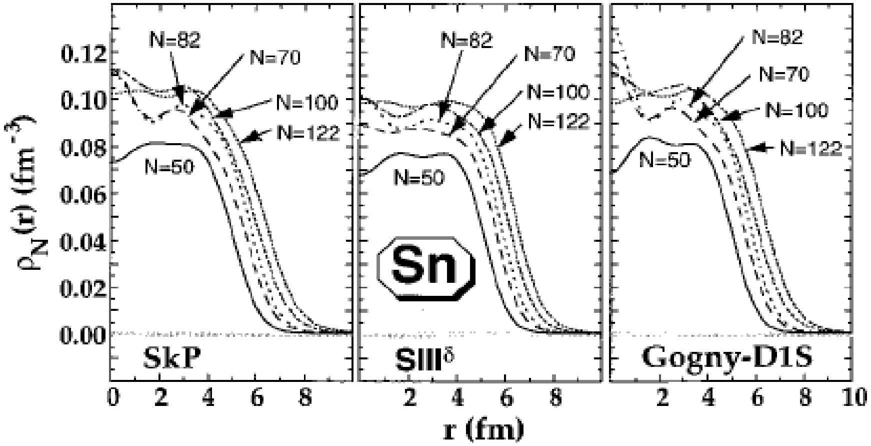
Modification of nn correlations (neutron-rich nuclei)



Neutron-proton correlations (proton-rich nuclei)



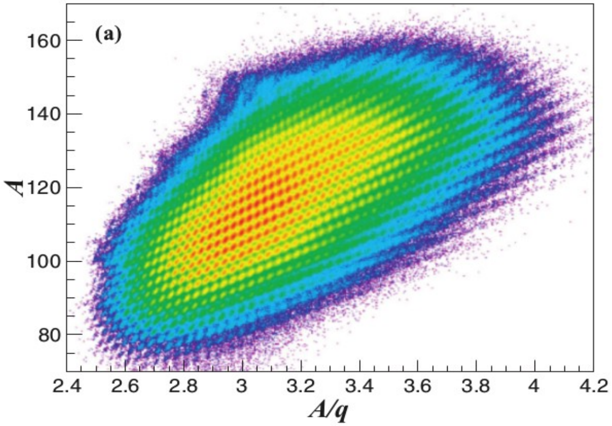
Through transfer probabilities the onset of density-dependent forces and neutron density profiles can be studied.

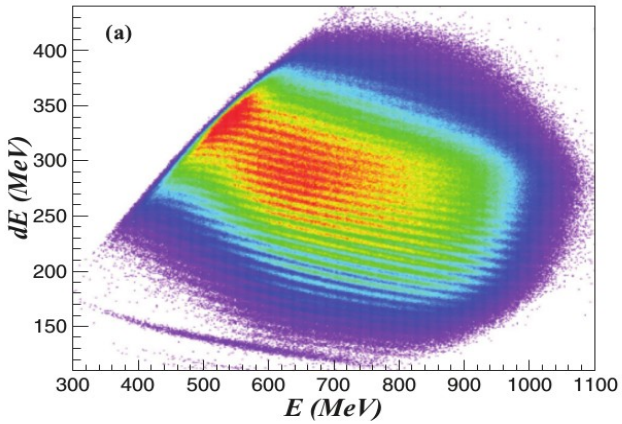


L. Corradi, Third International SPES Workshop, October 2016

Possibilities offered by heavy beams (Pb, U, ...)

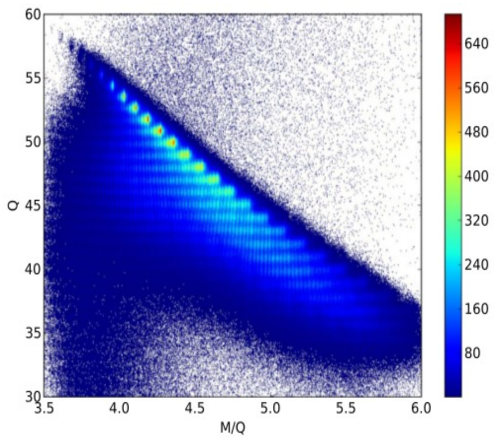
Nuclei close to Pb and U are receiving more and more attention.
Their complete identification in A, Z and Q value is still a very complex task.

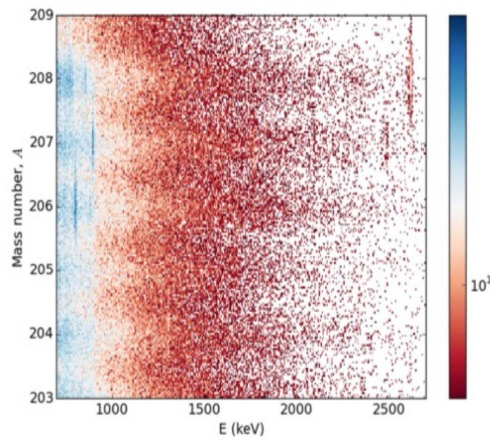




Fission fragments detected in VAMOS in the reaction $^{238}U+^{12}C$ @ 1.45 GeV

M. Caamaño et al., Phys. Rev. C **88**, 024605 (2013)

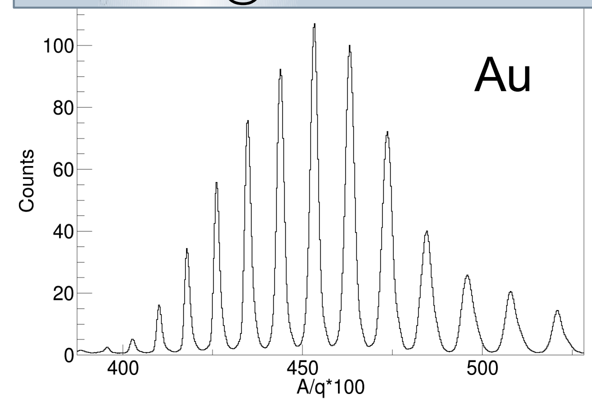




Heavy partner detected in VAMOS in the reaction $^{208}Pb+^{100}Mo$ @ 1.3 GeV

D. Ralet et al., Phys. Scr. **92**, 054004 (2017)

Heavy partner detected in PRISMA in the reaction $^{197}Au+^{130}Te$ @ 1.07 GeV



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