



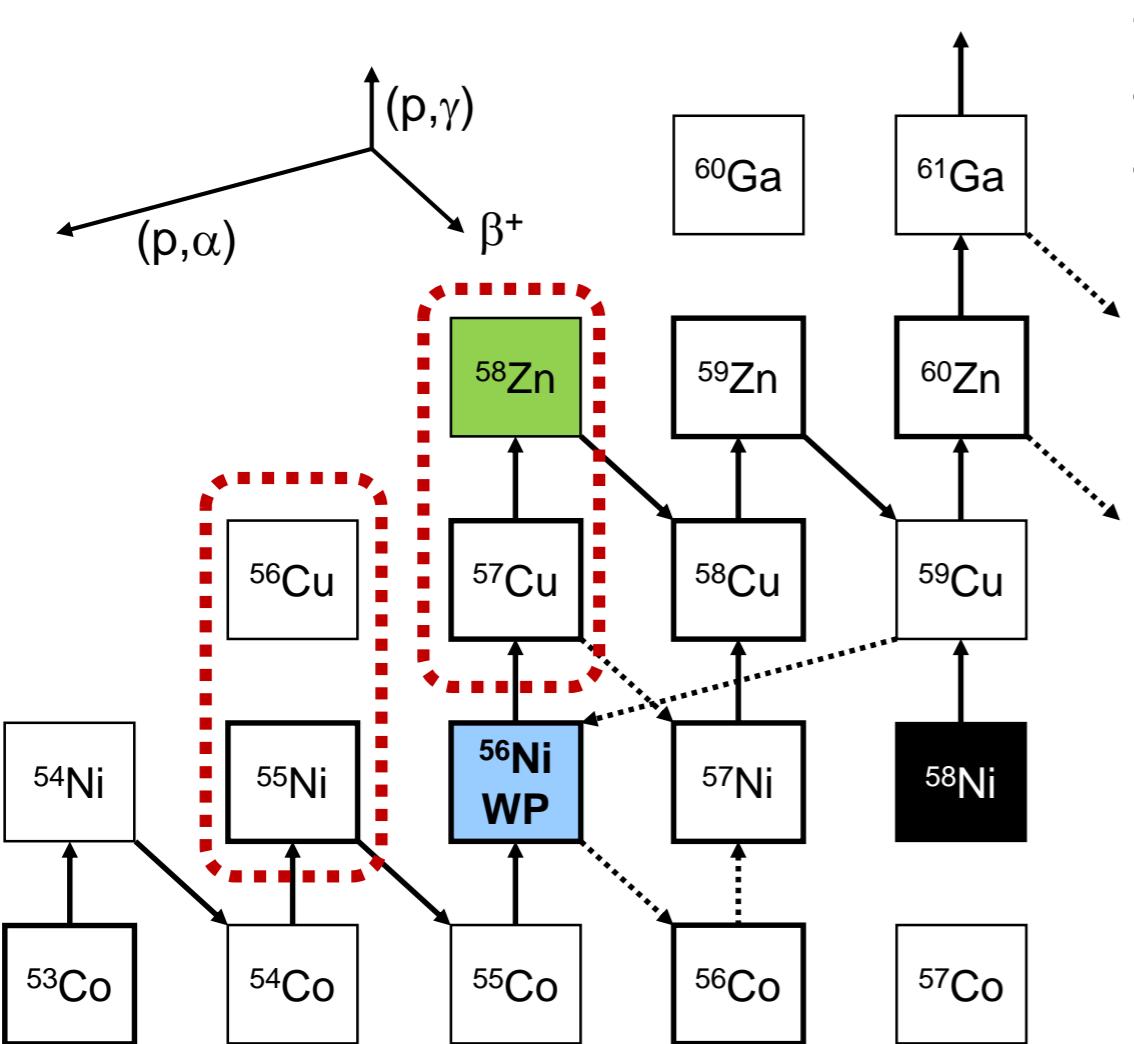
Physics cases for 2GeV proton beam at ISOLDE : Benefits for the mass measurement program

Maxime Mougeot

Centre de Sciences Nucléaires et de Sciences de la Matière
CSNSM-Orsay-FRANCE

Masses of neutron deficient rp-process nuclei

rp-process studies at ISOLTRAP



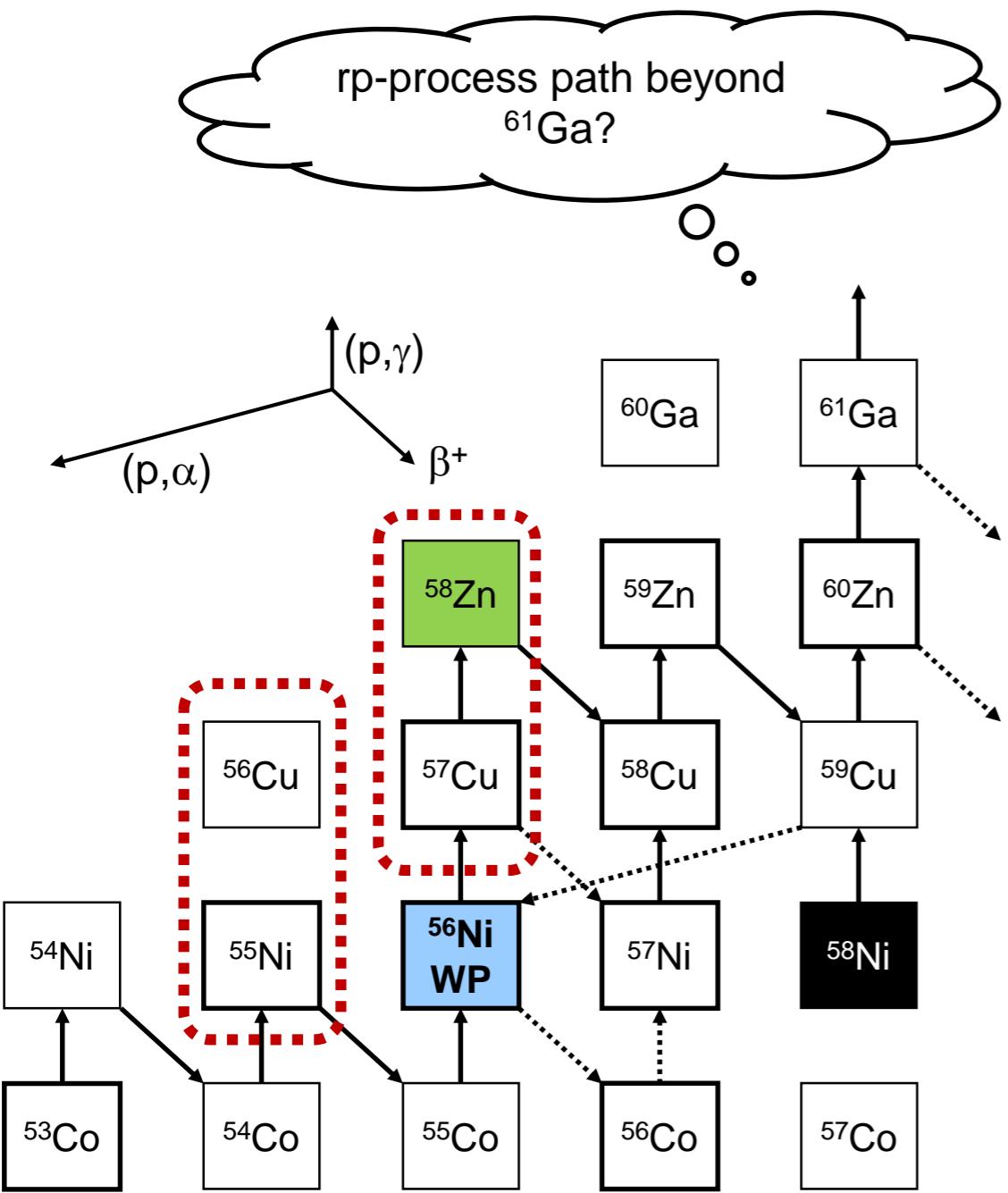
- $Q(p,\gamma) = m(Z,A) + m_p - m(Z+1,A+1)$
- Ratio of (γ,p) reaction rate to the reverse $\propto e^{-Q(p,\gamma)}$
- $^{56}\text{Cu}^*$ and ^{58}Zn accepted by the INTC \rightarrow IS625



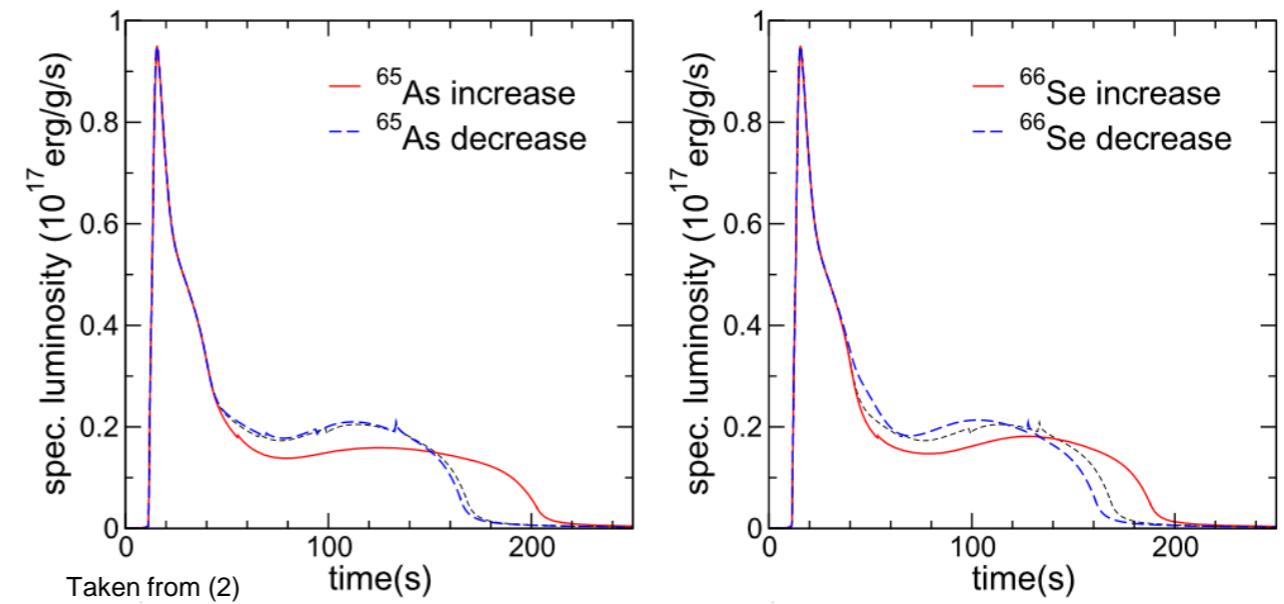
*Measured at LEBIT : A.A Valverde *et al.*, Phys. Rev. Lett. **120**, 032701

**Impact study : H. Schatz *et al.*, The Astrophysical Journal, 884:139 (11pp)

rp-process studies at ISOLTRAP



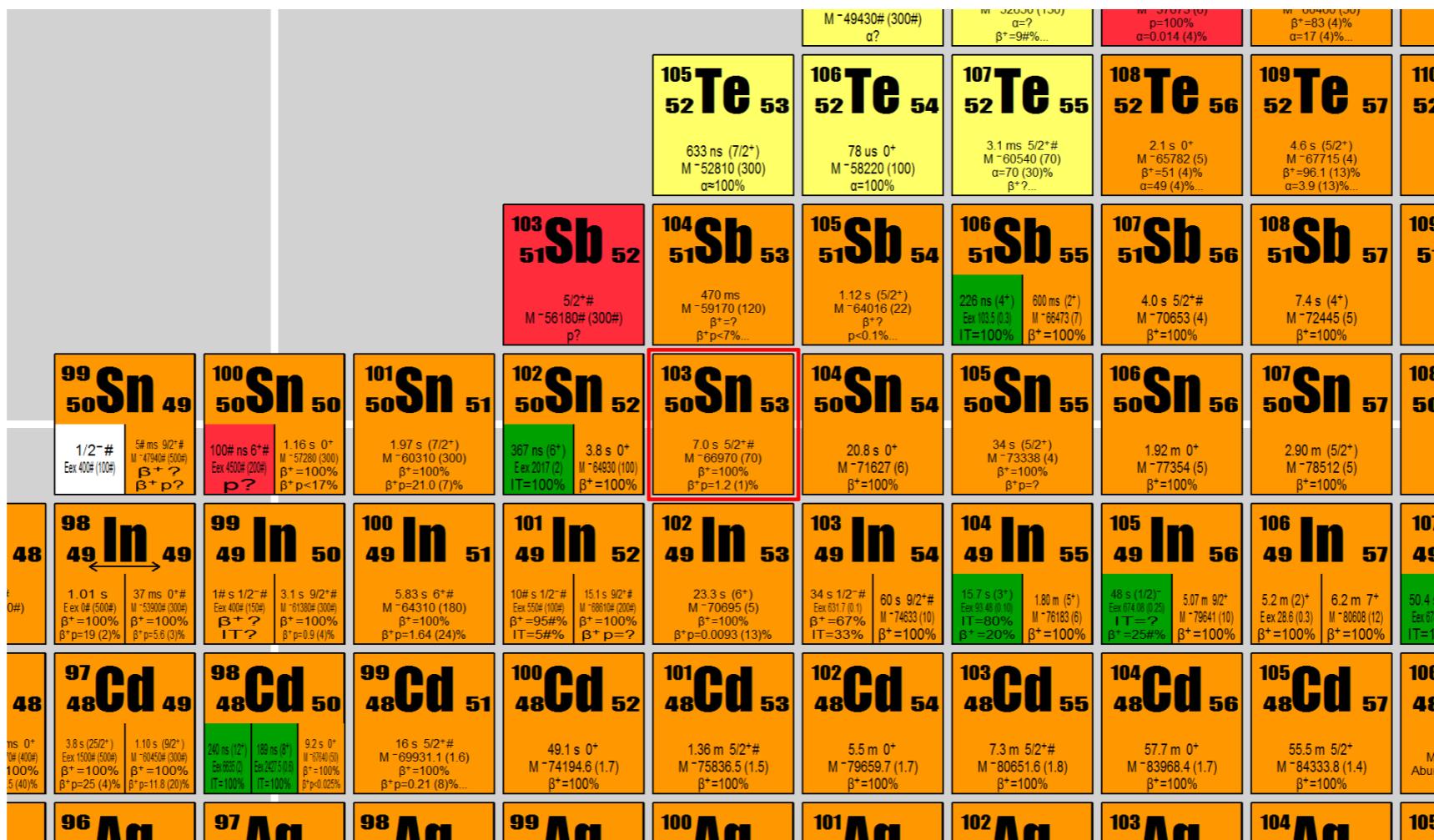
- $Q(p,\gamma) = m(Z,A) + m_p - m(Z+1,A+1)$
- Ratio of (γ,p) reaction rate to the reverse $\propto e^{-Q(p,\gamma)}$
- $^{56}\text{Cu}^{(1)}$ and ^{58}Zn accepted by the INTC \rightarrow IS625
- Other key waiting point ^{64}Ge
- Nuclei which strongly impact astrophysical observables⁽²⁾ : ^{58}Zn , ^{61}Ga , ^{62}Ge , ^{65}As , ^{66}Se
- Benefit from a factor 2 increase with ZrO_2 target



(1)Measured at LEBIT : A.A Valverde *et al.*, Phys. Rev. Lett. **120**, 032701

(2)Impact study : H. Schatz *et al.*, The Astrophysical Journal, 884:139 (11pp)

rp-process studies at ISOLTRAP



- Nuclear Astrophysics : rp-process studies towards the Sn-Sb-Te cycle
→⁹⁸Cd, ⁹⁹⁻¹⁰¹In impact the X-ray burst ashes composition strongly⁽²⁾
 - Nuclear structure : Probing the region around doubly-magic ¹⁰⁰Sn⁽³⁾ → ⁹⁹⁻¹⁰¹In (even ⁹⁸In?)
 - Benefit from a factor 2-3 on LaC₂ target

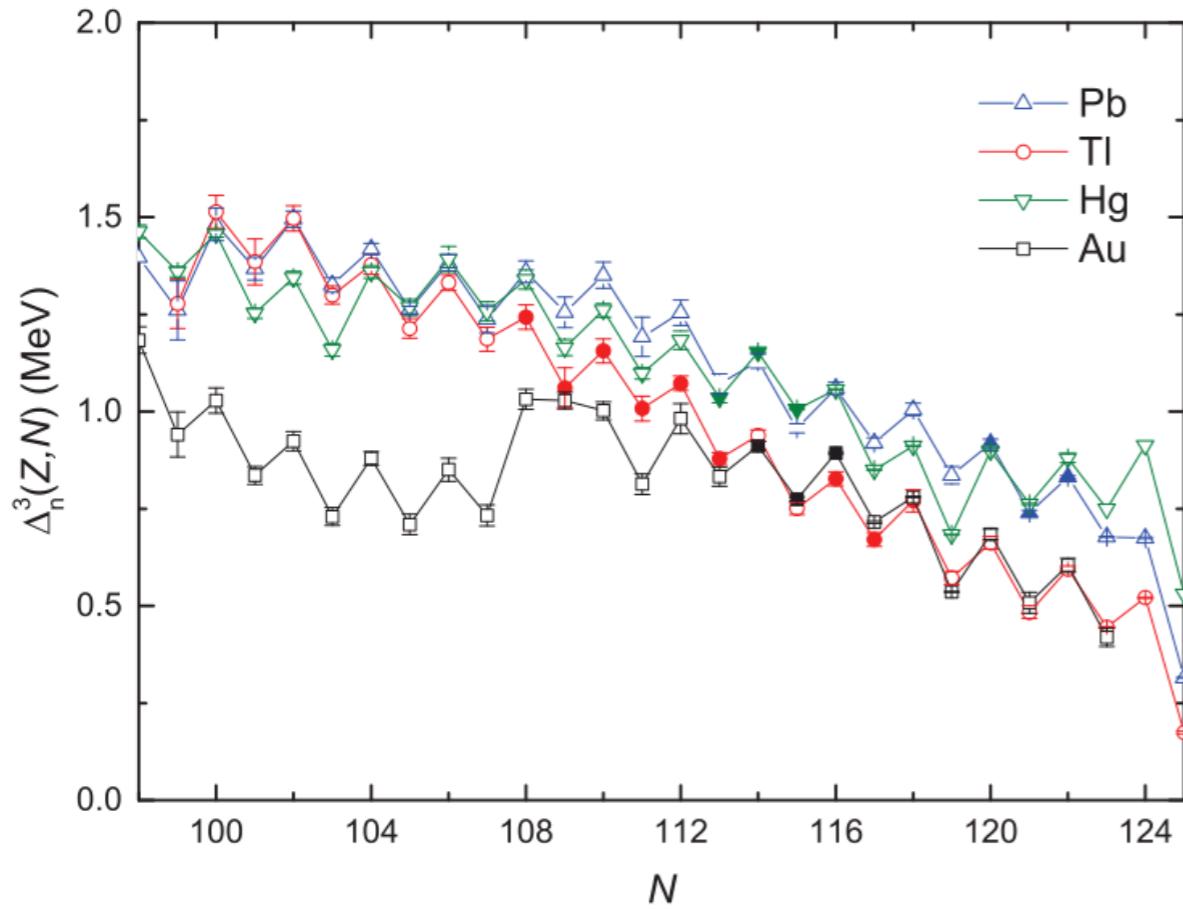
(2) Impact study : H. Schatz et al., The Astrophysical Journal, 884:139 (11pp)

(3) Link between direct link between ^{100}Sn and ^{100}In masses :

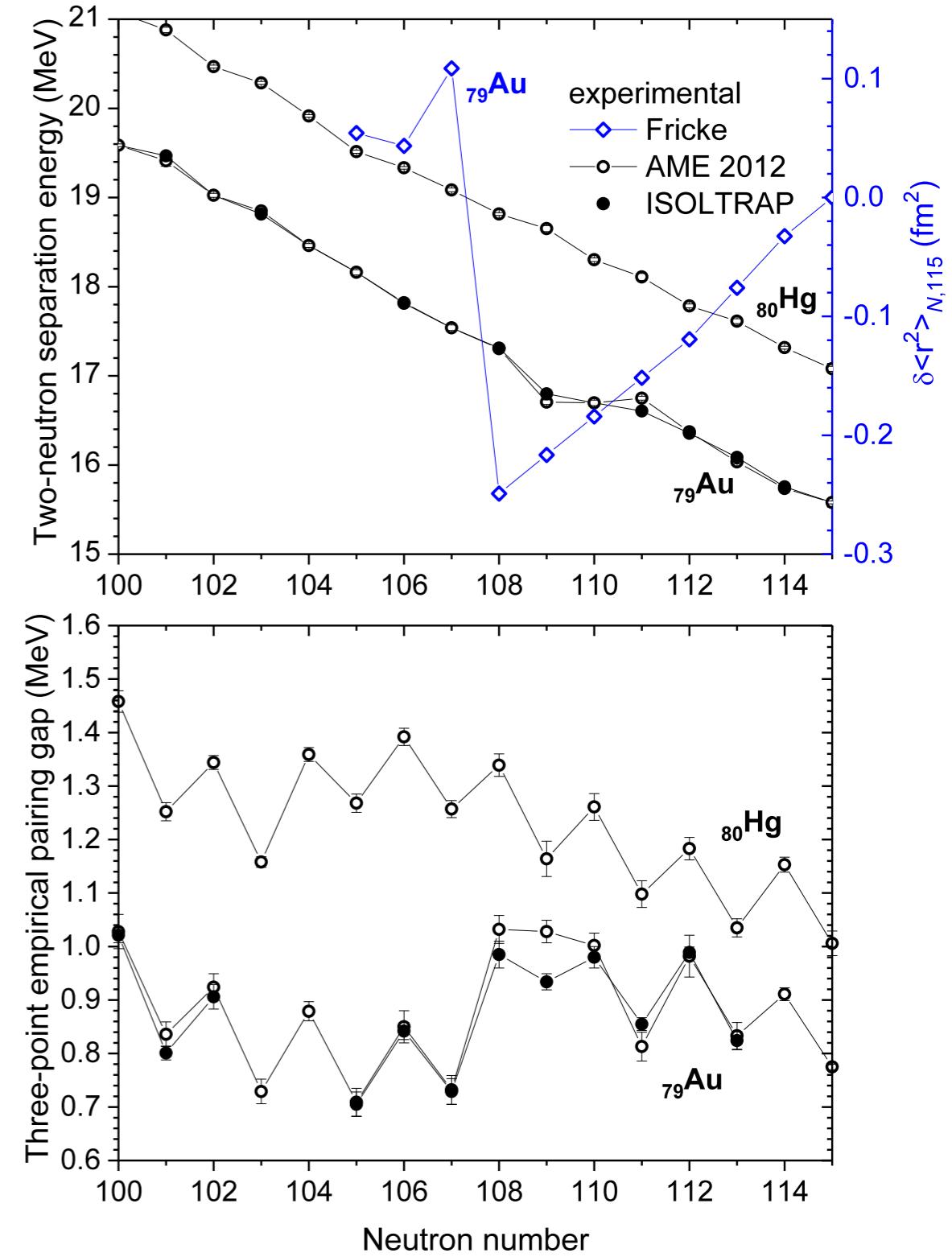
Mass measurements in the neutron-deficient Pb region

Mass measurements in the lead region

- Strong nuclear structure effects are observed by spectroscopy in particular on the neutron-deficient side from $Z = 77$ to $Z = 84$ around mid-shell $N = 104$.
- Similar effects with smaller magnitude were observed in the gold and mercury isotopes.



C. Weber et al. Nucl. Phys. A 803 (2008) 1–29;
Ch. Boehm et al. PHYS. REV. C 90, 044307, (2014)



V. Manea et al. PHYS. REV. C 95, 054322 (2017)

Mass measurements in the lead region

Enhancement factor of 3-5 with UC_x target
will allow extending the studies In this region
very close to the proton-drip line

