## Preliminary results from <sup>140</sup>Sm coulomb excitation experiment

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- The experiment

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- GOSIA2 calculations and very preliminary results

<sup>140</sup><sub>62</sub>Sm



<sup>140</sup>Sm is predicted to have prolate deformation of low lying excited states.

#### **Isomeric states**



• Lifetimes of low excited states unknown, due to isomeric  $10^+$  states of  $\pi(h_{11/2})^2$  and  $\nu(h_{11/2})^{-2}$ .

Goal



Obtain B(E2) and Q, using normalization to target excitation.

▶ 0<sup>+</sup> at 990 keV may indicate shape coexistence.

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- Particles detected in circular DSSSD. Angular range: [19.65 58.36] degrees



## Laser on/off



▶ Surface ionized <sup>140</sup>Sm seen with laser off.

## Decay data on thick Cu target



Most of the γ-lines identified from <sup>140</sup>Sm → <sup>140</sup>Pm (14.82m) or <sup>140</sup>Pm → <sup>140</sup>Nd (5.95m).

## Kinematic



▶ Scattered Sm detected from  $\theta_{CM}^{Sm} = 49.7^{\circ}$  to  $\theta_{CM}^{Sm} = 146^{\circ}$ 

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- Scattered Sm detected from  $\theta_{CM}^{Sm} = 49.7^{\circ}$  to  $\theta_{CM}^{Sm} = 146^{\circ}$
- ▶ Scattered Mo detected from  $\theta_{CM}^{Sm} = 63.1^{\circ}$  to  $\theta_{CM}^{Sm} = 140.7^{\circ}$

## Coincidences

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## Doppler corrected $\gamma$ -spectra



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- Maximum 0.8% <sup>140</sup>Nd

## Angular binning



Scan over  $\chi^2$ 



▶ Very PRELIMINARY  $B(E2, 2^+_1 \rightarrow 0^+_1) = 0.24(2)e^2b^2$ 

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- To early to determine  $B(E2,4^+_1
  ightarrow 2^+_1)$  or  $Q(2^+_1)$



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▶ Include lifetime of  $2 \rightarrow 0$  transition measured at HIL in Warsaw June 2013.

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Ongoing analysis by F.Bello (University of Oslo)



Accepted proposal for measuring conversion electrons from 0<sup>+</sup><sub>2</sub>



► Study of <sup>142</sup>Gd?



 Accepted High ISOLDE proposal <sup>140</sup>Sm on <sup>208</sup>Pd, 4.7 Mev.

# Thank you for your attention!

#### Questions?



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## Backup

#### **Recoil-Distance Doppler Shift Method**



target and stopper foil at distance d gamma rays are emitted

- ➢ in flight ⇒ peak Doppler shifted
- > stopped  $\Rightarrow$  sharp peak at energy  $E_0$

Lifetimes deduced from stopped and shifted intensities as a function of distance

