Points for inclusion

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January 22, 2018

1. What's interesting about the region, phenomena, motivation for the experiment?

Spectacular exhibition of shape coexistence

Point of cessation an open question for >40 years, numerous techniques have been applied in an attempt to these isotopes. Gamma ray spectroscopy indicated the disappearance of the coexisting prolate minima, however, without direct measurements of the ground state it was not possible to determine the point at which the phenomena stops.

2. How were we able to do this now?

If there is a method summary in the main text then this could maybe be merged with it:

Yields have not changed significantly in the last 40 years ((Ravn, 1979), (Lettry et al., 1997)) therefore our sensitivity has had to improve. We employed the technique of in-source resonance ionization spectroscopy ((Marsh et al., 2013)).

Summary of the experimental method:

- Production: CERN-ISOLDE
- Laser spectroscopy: RILIS
- Detection: Windmill, MR-ToF MS, Faraday cups

A new multi-photon stepwise resonance ionization scheme ((Goodacre et al., 2017)) and laser-atom interaction region [TDG1] ((Goodacre et al., 2016)) were developed to enable this technique to be applied for exotic mercury isotopes produced by a molten lead target. In this way it was possible to study exotic isotopes with experimental yields 7 orders of magnitude lower than the previously achieved for mercury (note: yield at limit of previous measurements: >1E^(6) /s (Raven 1979), yield at limit of our measurements <1E^(-1) /s).[TDG2]

3. What is new from the experimental results?

The results are the first direct ground state measurements below A=181. They demonstrate that the odd even staggering ceases at A=180. The results also demonstrate a steady reduction in deformation with decreasing N (also fitting well with the "back in shape idea"). The measured magnetic moments are applicable in the interpretation…

4. How does this compare to what was already known?

Could be discussed here or as part of point 1.

5. How do the MCSM results complement/aid with the interpretation of the experimental results?

Similarly to previous theoretical calculations, the MCSM calculations are unable to predict whether or not the odd-even shape staggering will stop at 180 or 178, it requires the experimentally measured magnetic moment to identify the correct eigenstate. It could be good to keep/emphasize the fact that they were undertaken to interpret the experimental results and that input from the experimental results is required for the to determine the correct eigenstates.

The experimentally measured magnetic moments inform the calculations, which are then in turn used to interpret/understand the experimentally measured isotope shifts. The symbiosis you mentioned is a nice way to bind the two parts of the paper together. For me, the experimental results that should be the core focus of the paper with the MCSM calculations presented as a way to understand and interpret them. We know (hopefully) our results are correct, the calculations are successful in that they can reproduce/help us interpret and understand them.

6. What is new/novel/groundbreaking theoretically, how does it compare to other calculations?

Provides a new method of interpreting the phenomena data. When combined with the experimentally measured magnetic moments, they are able to reproduce the phenomena. Size of the simulation?

[TDG1]This is maybe a bit of a stretch since this was not what drove this development

[TDG2]This one's a bit difficult, our yields were terrible because the target operation was screwed up and then later the Windmill was misalligned. I used "experimental" rather than "maximum" yields to try and get around this. I think it's ˜ 6 orders of magnitude if we're looking at maximum observed yields.

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