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EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

Proposal to the ISOLDE and Neutron Time-of-Flight Committee

Letter of Clarification
The (*d*,*p*) reaction on ^{206}Hg

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We address the comments raised by the INTC at the June 2016 meeting with regards the proposal P-467 titled "The (*d*,*p*) reaction on ^{206}Hg".

Comment 1: *"The authors propose to use the (d,p) reaction on 206Hg to study structure of 207Hg and to determine the evolution of neutron single-particle states with adding proton holes below 208Pb. This is a very important subject and the results would be of crucial importance for understanding the shell structure in an as-yet unexplored region of the chart of the nuclei."*

Response: We appreciate the comments of the INTC.

Comment 2: *"However, and – in line with P-470 below – there is a need for a commissioning period for this spectrometer. In addition, there is a worry about the fact that the Solenoid has not yet been commissioned. The device is identical to the ANL ones (the detector and electronics are the same) but a commissioning period would still be needed."*

Response: We agree with the comments of the INTC—a commissioning period is essential to the success of the ISOL Solenoidal Spectrometer (ISS) project.

Comment 3: *"Furthermore, the INTC expects the proponents to contact theoretical groups to obtain ab initio shell-model predictions and/or particle-core coupling calculations so as to connect the raw experimental data with the underlying single-particle properties. The INTC recommends that a letter of clarification be submitted."*

Response: In the proposal [1] we presented two simple calculations. These showed estimates for the centroids of the single-particle strength from a Woods-Saxon calculations [2] and a relativistic mean-field calculations [3]. Neither showed how the single-particle strength may fragment. In response to the above comment, we contacted Prof. B. A. Brown who carried out a shell-model calculation for us [4]. The results of the calculation are shown in Fig. 1. They show the single-particle strength of the first 10 fragments for a given j^π, which in all cases accounts for >90% of the single-particle strength, as a function of excitation energy. Also included are the centroids from the Woods-Saxon calculation, shown in the original proposal. As would be expected for one neutron outside of a closed neutron shell, the bulk of the strength is carried by a single state. Determining the location of the dominant single-particle states, with particular focus on the low-j $3s_{1/2}$ and $2d_{5/2}$ configurations, is the principal motivation of the proposal.

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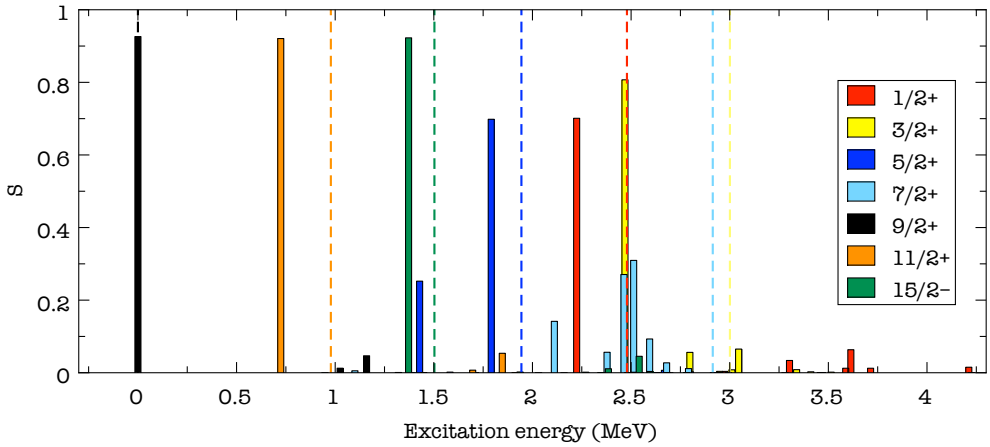

Figure 1: Spectroscopic strength as a function of excitation energy for the first 10 states for each j^π in ^{207}Hg. The vertical dashed lines are the centroids as derived from a Woods-Saxon calculation as shown in the original proposal.

References

[1] Proposal P-467 (CERN-INTC-2016-024, INTC-P-467), submitted for consideration at the June 2016 meeting of the INTC.
[2] A. Volya, http://www.volya.net.
[3] P. Zhao (private communication, 2016).
[4] B. A. Brown (private communication, 2016).