HAW09-2009-000165

Abstract for an Invited Paper
for the HAW09 Meeting of
the American Physical Society

Spectroscopy of the Heaviest Elements[1]

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The specific "magic" proton and neutron numbers, representing major spherical shell gaps, beyond 208Pb are a matter of considerable debate. It is well established that nuclei near Z=100, N=152 (252Fm) have well-deformed prolate shapes. By performing prompt and delayed gamma-ray spectroscopy on deformed transfermium nuclei we can learn about the single-particle structure, shell gaps, pairing correlations, and excitation modes in the heaviest nuclei. After a brief overview of state-of-the-art measurements, I will describe recent results from experiments at the 88-Inch Cyclotron of the Lawrence Berkeley National Laboratory which use the Berkeley Gas-filled Separator (BGS). I will then discuss the prospects of a new generation of spectroscopy measurements on the heaviest elements when the BGS is used in conjunction with the GRETINA gamma–ray tracking array.

[1]This work was supported in part by the U.S. DOE under contract no. DE-CA02-05CH11231 (LBNL).