Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Production of radon and thorium isotopes near N=126 shell closure in 48Ca and 54Cr induced fusion reactions on 162Dy DMITRIY MAYOROV, TYLER WERKE, MARISA ALFONSO, CHARLES FOLDEN, Cyclotron Institute, Texas A&M University — Production of spherical evaporation residues (EVRs) near N=126 shell in 48Ca and 54Cr induced reactions on a 162Dy target was investigated at the Texas A&M University Cyclotron Institute using the vacuum separator MARS. For the 54Cr+162Dy reaction, only upper limits for the 4n exit-channel cross section were measured; this can be attributed to a sizably increased fissility of the 216Th compound nucleus relative to 210Rn formed in the 48Ca bombardment. A factor of > 7300 separates the production cross sections of the 4n EVRs from each reaction. A semi-empirical estimate of the lower limit on the fusion probability, PCN, ratio between the two heavy ion projectiles is PCN(48Ca+162Dy)/PCN(54Cr+162Dy) > 1.2. Investigation of spherical nuclei produced by heavy ion fusion reactions is of current interest due to efforts to synthesize superheavy nuclei near Z=120, N=184 nucleon shells. EVRs produced near the N=126 shell closure have previously revealed surprisingly low survival probabilities despite stabilization from shell effects. Similarly, enhancement of the fission channel in the de-excitation cascade of 210Rn and 216Th is observed in this work and this result can be well modeled by the inclusion of collective effects into the statistical decay of excited nuclei calculations. These results suggest that cross sections for production of superheavy nuclei near predicted Z=120, N=184 closed shells may be small regardless of the anticipated strong shell effects.

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Date submitted: 10 Jan 2012 Electronic form version 1.4