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Prospects for Production of New Superheavy Elements using Projectiles with Z >20 CHARLES FOLDEN, Cyclotron Institute, Texas A&M University — Recent experiments have produced superheavy elements with atomic numbers up to Z = 118 in complete-fusion evaporation reactions using projectiles of ^{48}Ca, although projectiles with Z_p >20 will be required for the discovery of heavier elements. A systematic study of the reactions of projectiles of ^{44,48}Ca, ^{45}Sc, ^{50}Ti, and ^{54}Cr with a variety of lanthanide targets has been conducted at Texas A&M University. The products of these reactions are spherical, shell-stabilized nuclei near the N = 126 shell. Excitation functions have been measured for numerous reaction combinations, and the data show a substantial reduction in cross section for reactions with $Z_p > 20$ compared to the reactions of ^{48}Ca with the same targets. These data have been compared to a simple theoretical model which suggests that the probability of compound nucleus formation and the survival of compound nuclei are both negatively affected by the change from ^{48}Ca. In these reactions, significant collective effects decrease the survival of the compound nuclei and defy the assumption that strong shell-stabilization will increase the cross section. These results suggest that the production of new spherical, shell-stabilized superheavy elements with Z > 118 could be very difficult. This talk will discuss the most recent results and their implications.

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