Cyclotron Colloquium, Tuesday, March 23 at 2:00 PM

Binary and Ternary Break-up of Excited Projectile-like Fragments Produced in ^{124}Xe + ^{112,124}Sn Reactions at E/A = 50MeV.

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Abstract:
Peripheral reactions of ^{124}Xe ions with ^{112,124}Sn target nuclei were examined by measuring charged particles in a highly segmented silicon/CsI(Tl) array at forward angles together with the measurement of coincident neutrons. Charged particles were identified for Z≤54 and isotopically resolved for Z≤14. Of particular interest is the decay of the excited projectile-like fragment (PLF*) produced in these collisions into two or three large fragments (Z≥4). The dominant decay mode for such reactions is the aligned binary decay of the PLF*. Both the yield of binary decays and the alignment of the decay axis with the original PLF* direction are seen to vary systematically with the velocity damping of the PLF* and with the size of the smaller fragment (Z_L). The dependence of the composition (N-Z) of the smaller fragment on the decay alignment provides evidence for N/Z equilibration. Comparison of the degree of alignment with a Langevin model allows one to deduce the decay time-scale of the short-lived PLF* (0.25-1.5x10^{-21}s). The deduced lifetime systematically increases with increasing Z_L. For more damped collisions the PLF* is observed to undergo decay into three fragments. Size symmetric ternary breakup occurs with significant probability. This decay mode is examined and compared to the predictions of a statistical model (SMM). Within this model, a reduction in the symmetry energy is necessary to describe the measured isotopic distributions of the fragments.