HOT GDR AND DISSIPATION IN ^{224}Th

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The temperature and deformation dependence of the excitation energy dissipation in heavy-ion fusion reactions is still an open question [1, 2]. The spin distribution leading to evaporation residues as well as the shape of the GDR are sensitive measures whether dissipation is dominated from inside or outside the fission barrier. We designed an experiment to measure the spin distribution and GDR strength function of highly excited ^{224}Th in coincidence with evaporation residues. Standard statistical model calculations do not predict any evaporation cross section, and the fission probability at high excitation energy can be reduced due to dissipation. In ^{16}O + ^{208}Pb fusion reactions, evaporation residue cross sections of 10 mb have been measured [3].

The experiment was carried out at Argonne National Laboratory with a ^{48}Ca beam on a 810 mg/cm^2 ^{176}Yb target. The beam energies were 256 MeV, 219 MeV and 206 MeV with a current ranging between 30-70 nA. The high energy gamma-rays were measured with the ORNL/MSU/TAMU array of BaF_2 crystals for the GDR measurements and a BGO array for spin measurements. The FMA was used for evaporation residue separation and tagging.

The evaporation residue cross section from the ^{48}Ca induced reaction was about a factor of 200 smaller than the previously measured ^{16}O reaction. Thus the GDR was only measured at 256 MeV. Data for the spin distribution were taken at all three energies.

The analysis of this experiment is in progress.

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References

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