

Models for Rotational Spin Distributions of Primary Fission Products

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Data from the 1993 Gammasphere measurements of the GANDS93 collaboration [1] were analyzed for rotational band spin feeding intensities by Dubna members of the collaboration and presented [2] at the DANF96 Conference in the Slovak Republic. They found in the zero-neutron, so-called "cold fission," of ^{104}Mo (with ^{148}Ba partner) relative feeding intensities of 0.21:0.74:0.05 to $2+$, $4+$, and $6+$ levels (with feeding to $0+$ indeterminate,) for an average spin of 3.7. This average is below measured average spin values of fission fragments for fission with more neutrons evaporated, which averages around 5 for the light fragments. The ^{106}Mo "cold fission" has an even lower (2.4) average spin.

We have in our paper [3] at the DANF96 conference presented results from a careful theoretical study of the Coulomb excitation following scission, using a modified semiclassical theory with finite moment-of-inertia. Coulex starting from rest at scission gives too much spin, even when the initial spin is unrealistically set at zero. We must assume Coulex is reduced by substantial Coulomb-nuclear interference and fragment kinetic energy present at scission. Data analysis and theoretical studies are continuing.

References

- [1] S.J. Zhu, Q.H. Lu, J.H. Hamilton, A.V. Ramayya, L.K. Peker, M.G. Wang, W.-C. Ma, B.R.S. Babu, J. Kormicki, D. Shi, J.K. Deng, J.O. Rasmussen, M.A. Stoyer, S.Y. Chu, K.E. Gregorich, M.F. Mohar, S. Asztalos, S.G. Prussin, J.D. Cole, R. Aryaenejad, Y.X. Dardenne, M. Drigert, K.J. Moody, R.W. Lougheed, J.F. Wild, N.R. Johnson, I.Y. Lee, F.K. McGowan, G.M. Ter-Akopian, and Yu.Ts. Oganessian, from Idaho National Engineering Laboratory; Vanderbilt University; Lawrence Berkeley National Laboratory; Lawrence Livermore National Laboratory; Joint Institute for Heavy Ion Research, Oak Ridge; Flerov Laboratory of Nuclear Reactions, JINR, Dubna, Russia; Qinghua University, Beijing
- [2] G. Popeko, A. Daniel, and GANDS93 authors of preceding reference; Poster at Conf. on Dynamical Aspects of Fission (DANF96), Casta-Papiernicka, Slovakia, Aug30-Sep 4, 1996, Proceedings to be published.
- [3] Authors of this Annual Report, Invited paper by J.O. Rasmussen at DANF96 Conference of preceding reference.