Anomalous Fission Fragment Angular Distributions for $^{19}F+^{208}Pb$ Near- and Sub-Barrier Fusion Fission Reaction*

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Fission cross sections and fission fragment angular distributions have been measured with mica track detector for the $^{19}F+^{208}Pb$ reaction at the bombarding energies from 83 to 105 MeV. The fission excitation function is well reproduced on the basis of the coupled channels theory (CCFUS) as showing in Fig. 1. The transmission coefficients T_l for each bombarding energy were obtaied from those calculation. The theoretical angular distributions were calculated with a transition state theory in terms of the T_l extracted from the excitation function calculation. This calculation requires a parameter K_0 . They are taken from the systematics and from the Sierk model. It can be seen in Fig. 2 that the experimental anisotropy values are larger than theretical ones at the near- and sub-barrier energies . However, the difference can not be explained on the basis of present approaches. In order to have a clear understanding of the anomalous anisotropies at the near- and sub- barrier energies, it will be necessary to do further research both experimental and theoretical.

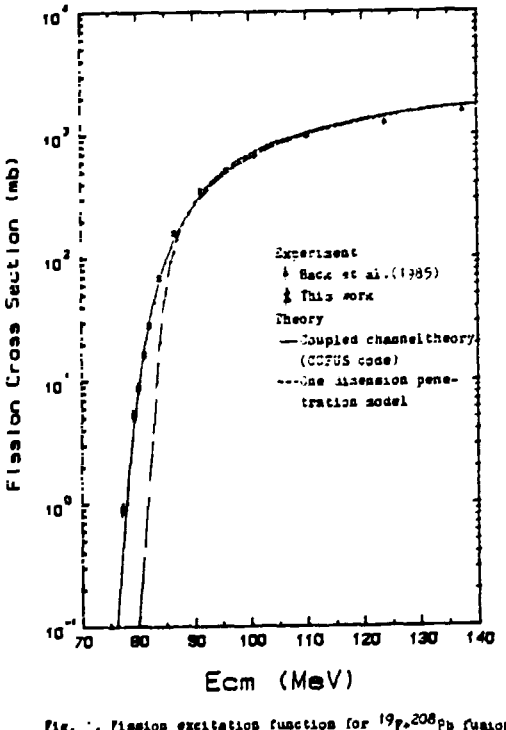

Fig. 1. Fission excitation function for $^{19}F+^{208}Pb$ fusion-fission reaction at near- and sub-barrier energies.

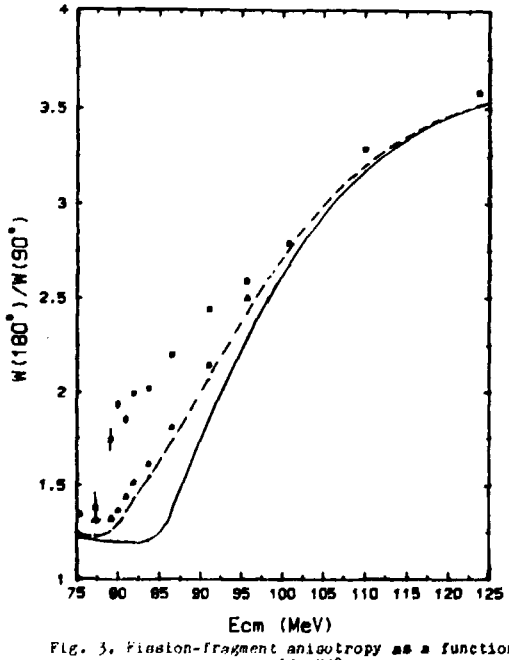

Fig. 2. Fission-fragment anisotropy as a function of center-of-mass energy for $^{19}F+^{208}Pb$ fusion-fission reaction. ● Back's data (1985); x This work's data; ▲ TST (transition state theory) with systematics K_0 and coupled channels calculation for T_l; ---TST theory with coupled channels calculation and Sierk model for J_{eff}; —— TST theory with simple one dimension penetration model and Sierk model.

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