

$^{90}\text{Zr}(\gamma, p_1)^{89}\text{Y}$ AND $^{90}\text{Zr}(\gamma, n_1)^{89}\text{Zr}$ REACTIONS CROSS
SECTIONS IN THE REGION OF GIANT DIPOLE RESONANCE

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The cross section for the reaction $^{90}\text{Zr}(\gamma, p_1)^{89}\text{Y}$ leading to the 900 keV isomeric state of ^{89}Y , $t_{1/2} = 16\text{s}$ was determined by irradiating natural Zr target in the betatron bremsstrahlung and measuring the induced activity. This isomeric state is populated also through the 78.4 h decay of ^{89}Zr , produced in the $^{90}\text{Zr}(\gamma, n_{tot})^{89}\text{Zr}$ reaction. In order to discriminate effectively between both reactions, irradiation time, sample transport time, and counting time were chosen as 64, 2, and 64 s respectively within a single measuring cycle. Several cycles in series and defined in time were performed to assure adequate statistics. Subsequently, the long living activity was measured and its calculated contribution subtracted from the total yield at each cycle. The procedure was repeated at different bremsstrahlung end-point energies and the cross section obtained from the resulting yield curve by the method of Penfold and Leiss.

The $^{90}\text{Zr}(\gamma, n_1)^{89}\text{Zr}$ reaction yield curve was measured by detecting the 4.18 min activity of the 588 keV isomeric state of ^{89}Zr . In this case 16 min were used as irradiation and counting time.

In both cases the gamma rays were measured with a Ge(Li) detector. A specially designed electronic controller ran the experiment and provided the required timing.

The results, shown on Fig. 1. should help to understand the reaction mechanism, particularly in respect to the isospin effects in the giant resonance of ^{90}Zr .

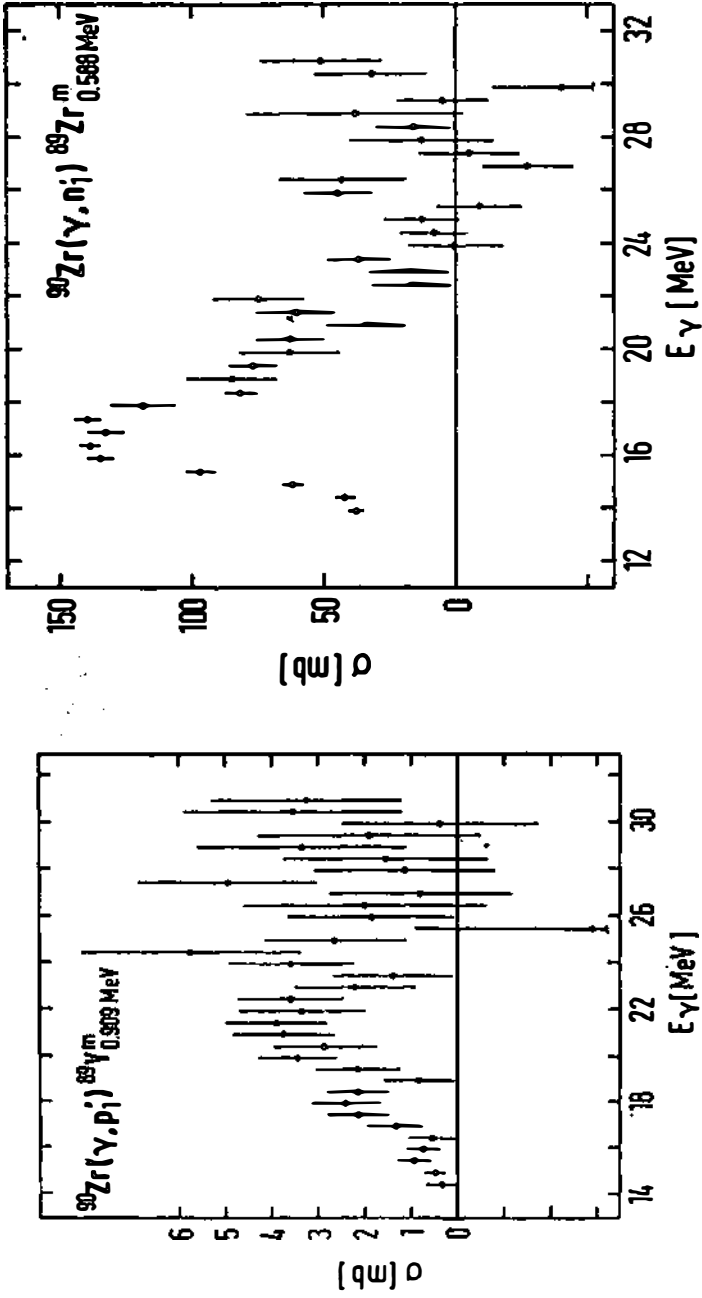


Fig. 1.