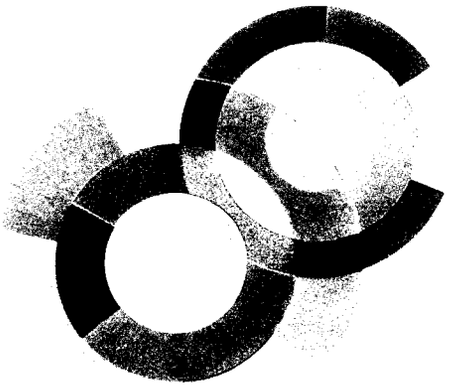

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Contributions to the Baryons '95 Conference

DAPNIA

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Role of the Roper Resonance in the Eta-Meson Photoproduction

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All sixteen observables for the reaction $\gamma + p \rightarrow \eta + p$ have been investigated from threshold up to 1.2 GeV. The formalism is based on an isobar model. In this approach electric and magnetic multipole amplitudes are expressed in terms of various isospin-1/2 nucleonic resonances plus a smooth background including S and P waves. The resonances are described by energy dependent relativistic Breit-Wigner forms. The background arises mainly from the nucleon pole diagrams, and possibly at higher energies from t-channel vector meson exchange processes.

The only well established information on the reaction mechanism based on old data from the 70's is the dominance of the S11(1535) resonances.

We perform a comprehensive analysis of the very recently published data from Bates ($E_\gamma^{lab} \leq .753$ GeV), Bonn ($E_\gamma^{lab} \leq .720$ GeV), and Mainz ($E_\gamma^{lab} \leq .790$ GeV) as well as the preliminary differential cross sections from Bonn ($E_\gamma^{lab} \leq 1.146$ GeV).

In our procedure, we fit *all* the recent data with the MINUIT least-squares minimization code implemented with our formalism. The role of the following resonances has been investigated :

S11(1535), S11(1650), P11(1440), P11(1710), P13(1720),
D15(1675), D13(1520), D13(1700), F15(1680), G17(2190).

The present results confirm the major role played by the S11(1535) resonance.

Our previous analysis using as data base only the preliminary Bonn data, did not seem to require the Roper resonance. The Mainz collaboration, performing a polynomial fit, reports also no need for this resonance. However, our latest analysis including *all* the above mentioned data shows that a model containing the three resonances: S11(1535), P11(1440), and D13(1520), gives a much better χ^2 than our previous best model [S11(1535), D13(1520), F15(1680)] and the favored reaction mechanism by Mainz collaboration including only S11(1535) and D13(1520) resonances.

We will present results which show clearly that the complete set of the new data implies a non negligible contribution from the Roper resonance. We will also produce predictions for the nodal trajectories and the polarization observables being, or planned to be, measured at Bonn, CEBAF, and Grenoble and will emphasize the crucial measurements needed to clarify the role of the Roper resonance in these processes.

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