

Photoproduction and Low Energy Electron-Positron Annihilation 

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SUMMARY OF THE PHOTOPRODUCTION AND
LOW ENERGY ELECTRON-POSITRON ANNIHILATION SESSIONS

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Although there were only six talks, as each of the speakers reported on a variety of results, there were several dozen different topics covered during the morning session. Only a fraction of these can be mentioned in a summary. The readers who wish to have a more complete list and judge what is of interest to themselves will find the speakers listed their topics at the beginning of their talks, and several have summaries at the ends of their talks.

The highlight of new phenomena is the observation of the photoproduction of charmed mesons. Events that correspond to the photoproduction of D mesons were reported by two groups, the Broad Band Beam at Fermilab (Gormley) and the Tagged Photon Beam at CERN (Richard) using known branching ratios, they estimate the cross-section to be about $\frac{1}{2}$ micro-barn. The CERN photoproduction experiment also presented data on the $\eta 3\pi$ decay modes and $\eta 5\pi$ decay modes which show a narrow enhancement at $2.03 \text{ GeV}/c^2$ in both channels. This corresponds to the value for the mass of the F meson reported by the DESY laboratory.

A very interesting event was observed in an emulsion exposed in the photon beam at CERN with the Ω spectrometer. It corresponds to a D^0 meson which decays into $K^+\pi^-\pi^-\pi^+$ with a mass of $1866 \pm 8 \text{ MeV}$ and a decay length corresponding to $(2.26 \pm .05) \times 10^{-14}$ seconds.

The one topic that was common to five of the six speakers was the 4π pion mass distribution in the region of $1600 \text{ MeV}/c^2$ (ρ' or ρ''). The enhancement seems to be predominantly $\rho\pi^+\pi^-$ and is about 600 MeV wide (the Adone group, Spinetti, uses a parameterized mass dependent width in a Breit Wigner formula). To a good approximation, the 4π distribution is very similar in both photoproduction and e^+e^- production. Rather interestingly two photoproduction groups also see the ρ'' (1600) decay into 2π with a width of about $300 \text{ GeV}/c^2$ and a peak that is shifted from the 4π peak. The readers should look at the comments by several theoreticians during the discussion period. They expressed the opinion that the two pion may represent the resonance width and that several additional contributions (and possibilities) could be affecting the 4π pion mass distribution.

There were also several contributions on the photon production of $p\bar{p}$; however, experiments with better statistics are needed to clarify this situation.

There is new, but not definitive, evidence in the region of 1250 of an enhancement in the $\omega\pi^0$ mass spectrum.

The dependence of the total cross section on energy was discussed by A. Eisner from several theoretical points of view. He also presented data that showed an appreciable rise with energy of the ϕ photoproduction. The theoretical understanding of the energy dependence of the ρ , ω , and ϕ photoproduction appears to be satisfactory.

Several groups reported on the photo and e^+e^- production of $KK(\pi\pi)$ final states. Gormley (and Lipkin during the discussion) pointed out that the ratio of $\phi\pi\pi/\omega\pi\pi$ is not as small as predicted by Okubo and can give insights into the degree to which various disconnected and hairpin Feynman diagrams are forbidden. Among the results reported by Sidorov from Novosibirsk is that they have measured the $\phi \rightarrow \pi\pi$, and they find a branching ratio of $1.0^{+.8}_{-.5} \times 10^{-4}$.

Both Orsay (reported by Delcourt) and Novosibirsk studied form factors in several reactions $e^+e^- \rightarrow K^+K^-$, $e^+e^- \rightarrow \pi^+\pi^-$, $e^+e^- \rightarrow p\bar{p}$. The $p\bar{p}$ form factor in this region is not in agreement with an extrapolation of the well known dipole form factor obtained in the electron scattering on protons.

A brief description of the new e^+e^- machine at Novosibirsk, (VEPP 4), is given in the report of Sidorov.

The above is an arbitrary sample of the topics reported. I wish to apologize to both readers and speakers for omitting topics that they considered more noteworthy and important.