Experimental studies of $\pi^+\pi^-$ and K^+K^- production in two-photon collisions

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We have measured the cross section of the processes, $\gamma\gamma \to \pi^+\pi^-$ and $\gamma\gamma \to K^+K^-$, with the Belle detector, using collisions of quasi-real two-photons at the e^+e^- colliding accelerator, KEKB.

In the c.m. energy region of two photons, 1.0 - 2.5 GeV, we find several resonant structures in these two processes. They are considered to be due to established or un-established meson resonances with the state, $J^{PC} = (\text{even})^{++}$. The peaks from $f_2(1270)$ and $f_2'(1525)$, in $\pi^+\pi^-$ and K^+K^- final states, respectively, are clearly observed. Besides them, we find some resonant peaks in the 1.7 - 2.1 GeV region, which are the first observations in these processes. The angular distributions of the processes, $d\sigma/d|\cos\theta^*|$, are analyzed to get the information on the spin and helicity state of these resonances.

We have obtained the ratio of the cross sections, $\sigma(\gamma\gamma \to K^+K^-)/\sigma(\gamma\gamma \to \pi^+\pi^-)$ in the higher energy region, 2.5 - 3.5 GeV. We find that the ratio is roughly independent of the c.m. energy, and it is compared with some theoretical predictions. The angular distributions in this energy region are also measured.