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Studies of the ISR process $e^+e^- \rightarrow \pi^+\pi^-\pi^0\gamma$ at the ϕ mass with the KLOE detector

Experimental measured value of the muon magnetic moment

$$a_\mu = \frac{g_\mu - 2}{2}$$

has a long-standing and well known discrepancy comparing with Standard Model prediction that has been narrowed down within a range $3.2 - 3.6 \sigma$ after years of efforts made by experimentalists and theoreticians. Previous results of dipion cross section $\sigma_{\pi\pi} = \sigma(e^+e^- \rightarrow \pi^+\pi^-)$ from KLOE have provided comprehensive and substantial studies on the largest experimental input from hadronic contribution. In order to deepen the understand of theoretical uncertainty for a_μ , it is natural to extend the studies to three pion cross section, which is the second largest hadronic contribution to a_μ .

The initial state radiation (ISR) process $e^+e^- \rightarrow 3\pi$ has been studied at a center-of-mass energy $\sqrt{s} \approx 1.019$ GeV close to the ϕ resonance using a 1.7 fb^{-1} data sample collected with KLOE detector at the DAΦNE year 2004/2005. In this analysis, we have studied the visible section $\sigma_{3\pi}^{\text{vis}}$ of process $e^+e^- \rightarrow \pi^+\pi^-\pi^0$ for the effective center-of-mass energy $\sqrt{s'}$ corresponds to omega mass range $M_{3\pi} \in [720, 900] \text{ MeV}/c^2$.

With the same dataset, a further study of \mathcal{C} -violating decay $e^+e^- \rightarrow \phi \rightarrow \omega\gamma$ is being performed based on a careful investigation of the ISR process, which is the major background with identical 3π final state.

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