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Type: **Plenary Presentation**

## **Study of additional radiation in the initial-state-radiation processes $e^+e^- \rightarrow \mu^+\mu^-\gamma$ and $e^+e^- \rightarrow \pi^+\pi^-\gamma$ in the BABAR experiment**

*Friday, 8 December 2023 14:10 (20 minutes)*

A dedicated study of additional radiation in  $e^+e^- \rightarrow \mu^+\mu^-\gamma$  and  $e^+e^- \rightarrow \pi^+\pi^-\gamma$  initial-state-radiation events is presented using the full BABAR data sample. Results are presented at next-to- and next-to-next-to-leading order, with one and two additional photons, respectively, for radiation from the initial and final states. Comparison with predictions from Phokhara and AfkQed Monte Carlo generators is performed, revealing discrepancies in the one-photon rates and angular distributions for the former. This disagreement has a negligible effect on the BABAR measurement of the  $e^+e^- \rightarrow \pi^+\pi^-(\gamma)$  cross section, but may affect other measurements significantly.

### **Name of collaboration or list of co-authors**

BaBar collaboration

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**Session Classification:** Friday after lunch