Feasibility Studies for an Inclusive R-Measurement using ISR with BESIII

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PRISMA



Anomalous Magnetic Moment of the Muon

- Deviation from g = 2: $a_{\mu} = \frac{(g-2)_{\mu}}{2}$ •
- Discrepancy of 5.1 σ between •
 - **Experimental World Average**
 - Standard Model prediction
- Uncertainties dominated by hadronic contribution
- Additional tensions between
 - Dispersive approach using e^+e^-
 - Lattice QCD evaluation

and within e^+e^- cross section measurements

 5.0σ 5.1σ SM: e+e- HVP



Taken from James Mott: https://indico.fnal.gov/event/60738/

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Analysis Strategy

- Detect ISR photon in barrel of calorimeter
- Look for charged tracks in the drift chamber
 - Very high efficiency to find tracks after tagging the ISR photon
- Reconstruct mass of hadronic final state from recoil of ISR photon
- Suppress background

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- QED
- Hadronic





Electron Rejection



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Hadronic Mass Resolution

Measure ISR photon directly



Measure ISR photon via pair creation



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