MC in Particle Physics Experiment

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What Do We Need MC For?

- Detectors are not fully hermetic ⇒ Acceptance calculation

$$\sigma = \frac{N}{L\epsilon(1+\delta)}$$

- Expected distributions
- Primary generators
- Simulation of detector response
  (full simulation by GEANT or fast simplified code)
- MC events are processed with the same codes as real events

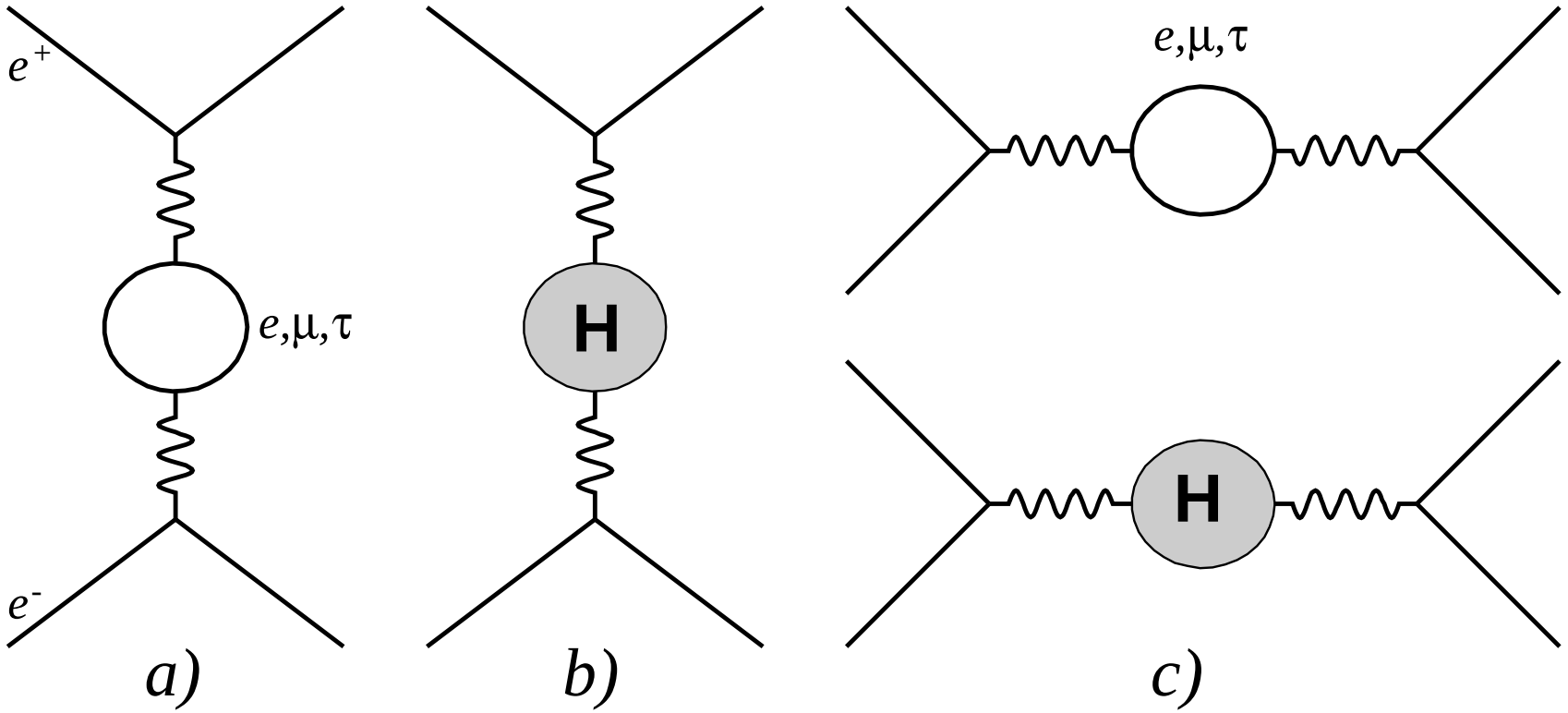
Radiative Corrections

- Initial State Radiation (ISR):
  Taking into account is straightforward (QED only!)
- Vacuum polarization:

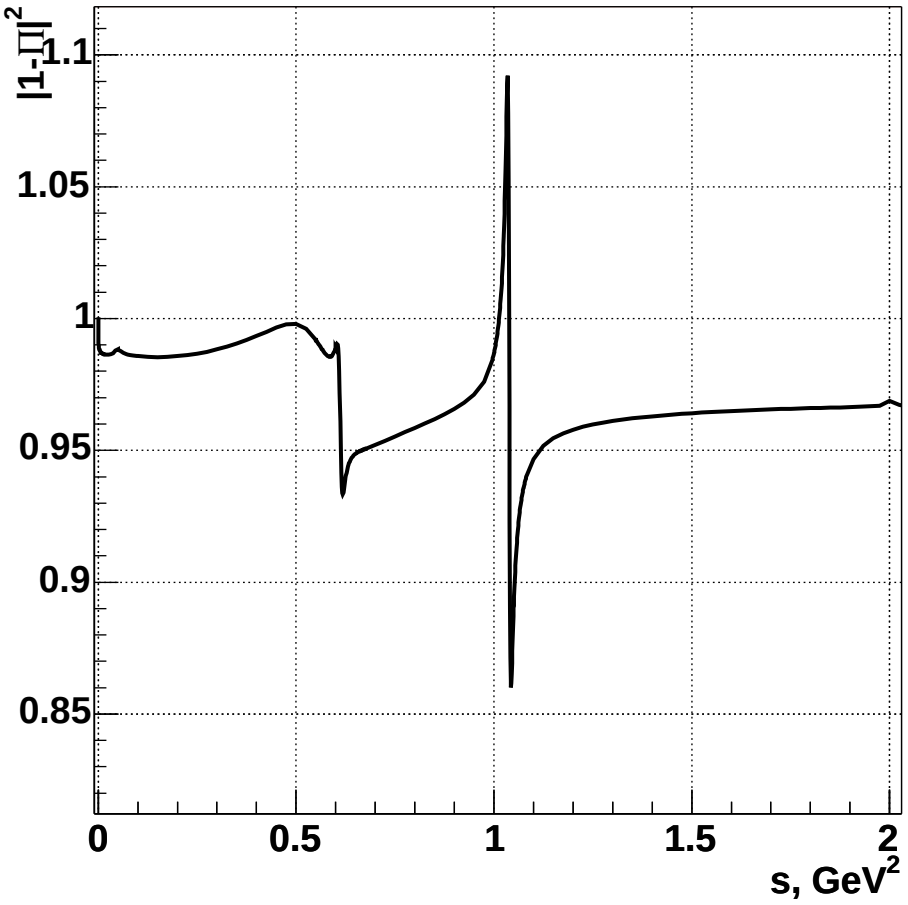
$$\Pi(s) = \Pi_{\rm lep}(s) + \Pi_{\rm had}(s)$$

- Final State Radiation (FSR):
  Model-dependent, sQED and/or particular models

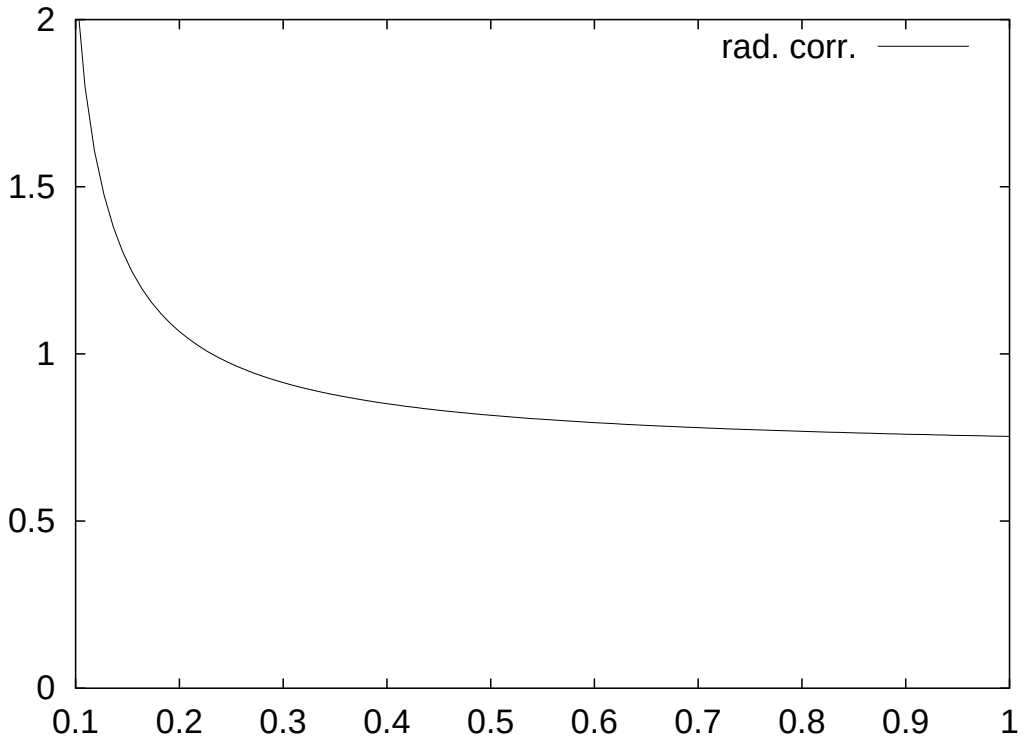
Vacuum Polarization – I



Vacuum Polarization – II



FSR Correction



$$\sigma_0(s) = \sigma|1 - \Pi(s)|^2(1 + \tfrac{\alpha}{\pi}\mathcal{F}(s))$$

Conclusions

- Measurement of cross sections at better than 1% level needed
- We need reliable and precise enough Monte Carlo generators based on the adequate precision theory
- Life would be much easier WITHOUT radiative corrections!