Task 2.3 - detector performance: muon and photon reconstruction

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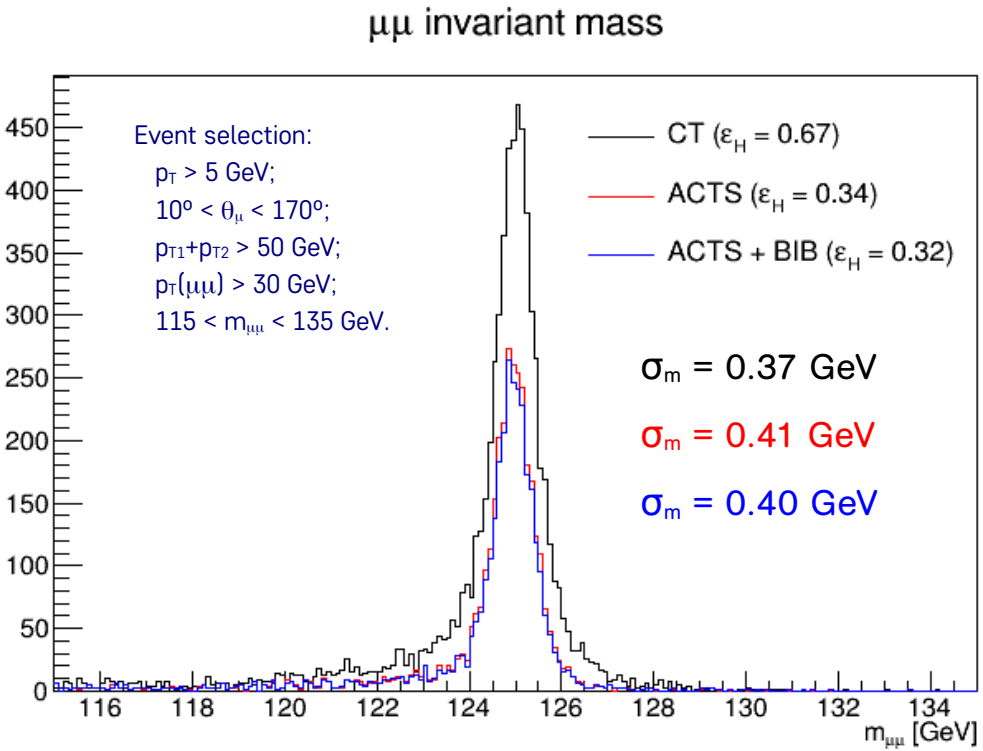
Status of WP2-Task 2.3 activities

- Task: evaluation of the detector performance at different collision energies with major physics processes.

- Latest activities:
  - muon reconstruction performance in the $H \to \mu\mu$ sample at 3 TeV;
  - photon reconstruction performance with the PbF_2 semi-homogeneous calorimeter Crilin.

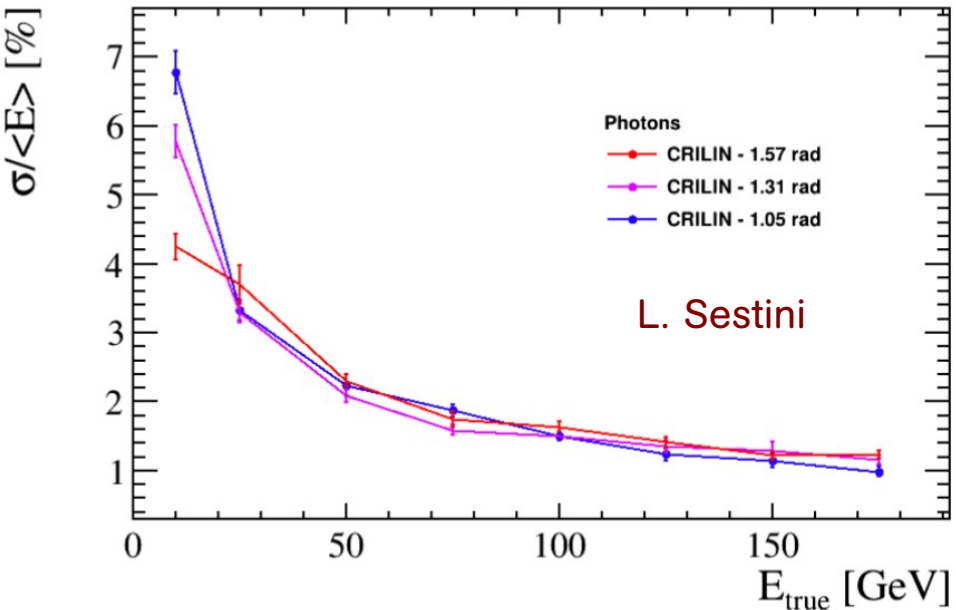
H → μμ at 3 TeV: μ reconstruction with BIB



- Muons reconstructed and identified with the Combinatorial Kalman Filter (implemented in the ACTS package) + Pandora PFA:
  - effect of BIB on H → μμ yield around 2%;
  - but observed an overall muon reconstruction inefficiency that seems due to a pattern recognition inefficiency in the track finding.
- More details in:

  M. Casarsa, "Muon reconstruction in the H → μμ channel with BIB", Detector Performance and MDI Meeting on 9/5/2023.

Photon reconstruction with BIB



$$\frac{\sigma}{E} \simeq \frac{14\,\%}{\sqrt{E}}$$ for theta = 1.57

- Photons reconstructed with Marlin digitization + Pandora PFA clustering.
- After energy-threshold tuning to minimize BIB impact, photon reconstruction efficiency very close to 100% for E_γ > 25 GeV and very good energy resolution.
- More details in:

  L. Sestini, "Improved calorimeter reconstruction at Muon Collider", Detector Performance and MDI Meeting on 11/4/2023.