CMS Requirements from Geant4

Geant4 Technical Forum
April 10, 2018

Sunanda Banerjee

Improvement of Hadronic τ Decay Simulation

- CMS had been facing crashes while simulating single particle τ guns with large p_T values (~ 100 GeV)
  - This happens more in the forward direction where τ momentum could be as high as 1 TeV
  - This happens with earlier CMSSW builds (using version Geant4 version 10_2_patch02) as well as most recent CMSSW (using version 10.4)

- Thanks Makoto to provide a fix for this bug which we can use

- However, the current implementation uses phase space decay for τ's.

- CMS requests a more realistic matrix element for decays τ → ν + hadrons

Include Linear Polarization into HE γ Models

- This has potential usage in the analysis of H → γ γ
  - Decay of scalar particles to γ's will have the planes of polarization of γ's to be parallel while decays of pseudo-scalar particles like π^0 the planes will be perpendicular
  - Investigate the effect of treatment of polarization in the shower shape of photons
    - May give additional handles to distinguish direct γ's from H decay from BG γ's
- CMS requests inclusion of effects of γ polarization in the high energy EM models