QCD PROCESSES WITH PYTHIA

- soft & hard → charm and bottom production sets

Soft QCD

they represent the total cross section of hadron collisions separated from the process we wanna study.

$$\sigma_{tot} = \sigma_{H} - \sigma_{process}$$

minimum bias: set of trigger configurations

trigger: a system that decides which events to keep in a particle detector.

SETTINGS:

SoftQCD:all = ON/OFF → turns on all soft QCD processes.

SoftQCD:minBias

SoftQCD:elastic → elastic scattering $A\ B \rightarrow A\ B$

SoftQCD:singleDiffractive → $A\ B \rightarrow X\ B$, $A\ B \rightarrow A\ X$

> single diffractive scattering: one of the beam particles breaks up and produces particles in the hemisphere opposite to the detected particle.

SoftQCD:doubleDiffractive → $A\ B \rightarrow X_1\ X_2$

HARD QCD

QCD jet production above a min p_T threshold. If the ptMin value is set too low, absurdly large jet cross sections will be obtained.

P_T: component of the momentum perpendicular to the beam line. it's important, because gives info on the "interacting" partons rather than non-interacting.

SETTINGS:

HardQCD:all = ON/OFF → turns on all hard QCD processes.

HardQCD:gg2gg → g g → g g scattering

HardQCD:gg2qqbar → where q: light quark (uds)
g g → q qbar

HardQCD:qg2qg → q g → q g , qbar q → qbar g

HardQCD:qq2qq → q q' → q q' q qbar' → q qbar'
qbar qbar' → qbar qbar'

HardQCD:qqbar2gg → q qbar → g g

HardQCD: qqbar2qqbarNew → q qbar → q' qbar' (q = u,d,s)

Prompt Photon Processes

section for photons produced from hard processes. pT cut is used to establish physical meaning.

PromptPhoton: all

PromptPhoton: qg2qgamma

PromptPhoton: qqbar2ggamma

PromptPhoton: gg2ggamma

PromptPhoton: ffbar2gammagamma

PromptPhoton: gg2gammagamma