Initial State Radiation (ISR) primarily consists of gluons radiated before the hard interaction. ISR is a source of systematic uncertainty in many measurements.

ISR in Drell-Yan events studied at the generator-level.

Drell-Yan suitable for ISR studies:
- not sensitive to FSR
- will be available in early data

Next, top pair events with the ISR More/Less were generated.

Pythia parameter description | Pythia parameter | default | Range
---|---|---|---
$\Lambda_{QCD}$ value in ISR shower | PARP(61) | 0.192 GeV | 0.100 0.384
scale factor in ISR shower evolution | PARP(64) | 1.00 | 0.25 4.00

ISR More: $\Lambda_{QCD} = 0.384$ GeV, scale factor = 0.25
ISR Less: $\Lambda_{QCD} = 0.100$ GeV, scale factor = 4.00