

Pythia 6.3

Stan Thompson

June 16 2005

Status

- Current Releases

New Features

- New model for Multiple interactions
- other

Usage

- Pythia
- within CDF

Status – Current Releases

CDF 6.216

as distributed in kits for cdfsoft
and installed on central machines.

Dates back to April 2003

Fermilab 6.226

for all supported OS

6.319

for Linux SL3 but RH7.3 OK

Pythia 6.321

New Features – Multiple Interactions

Two new models for the multiple interaction scenario have been introduced in the Pythia 6.3 versions.

The first, so called 'intermediate model' was released over versions 6.301 to 6.305 and was the default until 6.312. A complete description is presented in - [T.Sjostrand and P.Skands, JHEP 03 \(2004\) 053](#)

The new model now introduced is termed the 'interleaved model' was released with version 6.312. This scenario based on pT ordered ISR and FSR showers is deemed so different that a new event generation routine is available to use it. This is discussed fully in - [T.Sjostrand and P.Skands, hep-ph/0408302](#)

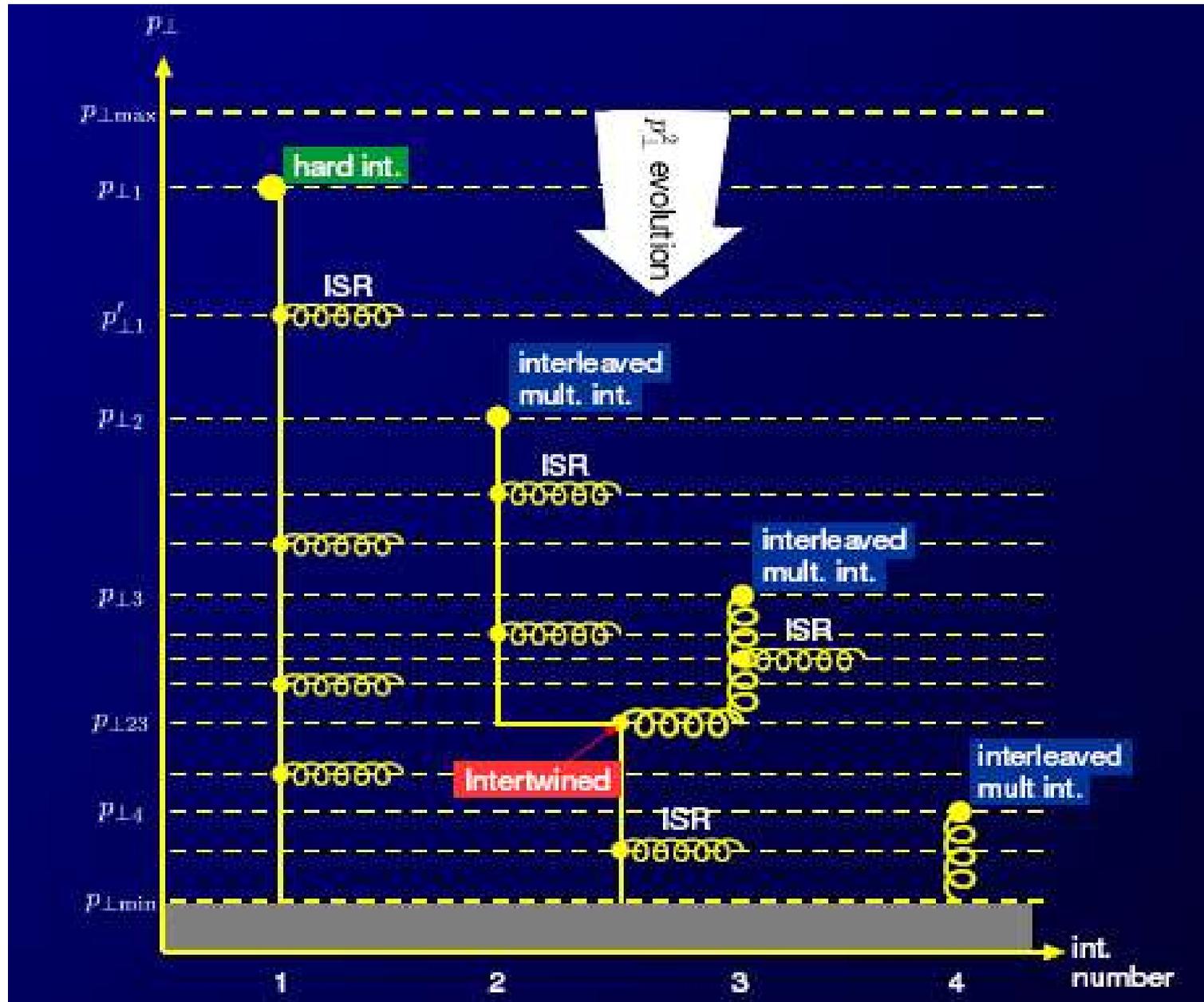
Multiple Interactions (2)

The interleaved model is based on pT ordering rather than the $Q^2=m^2$ ordering as used previously, the pT and the m being considered in the context of an a bc branching.

The branchings are taken in order of falling hardness with an interplay between the multiple parton interactions and ISR. An ISR branching reduces the phase space available to all further branchings at a lower scale.

This is true for all interactions and not just the hardest as was the case previously, branchings off the hardest interaction will only be unaffected if they are above the pT scales of any secondary interactions.

Multiple Interactions - Schematic Figure



Multiple Interactions (3)

The flavour content of the beam remnant is now noted such that if a quark is used for an interaction the flavour of the remnant is altered accordingly and dependent of whether the quark was a valence quark or a sea quark.

Thus the standard parton densities are only used to describe those interactions of the hardest interaction above the P_T scale of subsequent interactions.

Other New Feature

A new interface was defined in Les Houches 2003 between SUSY spectrum and decay calculators and event generators.

This is now available along with an option in PYLIST to provide Les Houches style colour tags rather momentum information.

Usage

There are now 2 event generation routines provided to handle the multiple interactions models -

PYEVNT

The old routine, by default this selects the old model and the intermediate model is available as an option. Many options the same, but this should be checked. The possibility to switch models provides additional options which need to be studied.

PYEVWT

New routine to use the interleaved model, more options are available. But many parameters need to be tuned differently for the old and new models, do not expect to get sensible results using old tunings.

Usage(2) within CDF

In principle there are no incompatibilities with common blocks or subroutine calls, using the old MI model for 6.3 should produce the same results as running with compatible parameters as a later version of 6.2

We can indeed switch between the two versions and run giving satisfactory results. Not clear we get the same results though.

There is no mechanism for using PYEVWT for the new MI model in the CDF software, but no problem to implement this.

The ISASUSY interface is based on ISAJET 7.69, we only have 7.51 as yet, there could be a problem here.

Usage(3) within CDF

There is a technical problem, 6.2 versions are distributed the LUND package in the lund library. 6.3 versions are distributed in a new PYTHIA package in the the pythia library.

There is no mechanism within CDF to replace lund with pythia if the 6.3 version is setup, can only add to the library list. The different routines with the same name are both present in the build list.

This needs to be resolved !

To run at present need

- Pythia 6.319 installed; via upd
- arch_spec_pythia.mk* in SRT_CDF modified to link pythia lib
- Binary building makefile modified (eg for cdfGen in generatorMods)

Summary

Pythia 6.3 looks promising, the new MI model gives better agreement with m.e. Generators.

Parameters cannot be used 'out of the box', gives unpredictable results.

Need first to check old model gives same results as 6.2 with tune A for example.

Then careful tuning with new model.

But problems currently preventing straightforward use in CDF framework.

