

Particle ID Codes in MC

R.J. Tesarek
Fermilab

Monte Carlo Meeting
2/12/04

Problem:

- EvtGen particle definition table contains more particles than CDF ParticleDB.
- EvtGen uses PYTHIA conventions for particle ID codes.
- Most “new” particles are “excited pions” ($\pi(2s)$, $\rho(3s)$, etc.) or heavy flavor “onia” ($\psi(2s)$, Ψ family, etc.).

Note: Translation to PDG codes is applied using StdHEP function (during HepEvt formation).

Particle code translation needs to be checked!

Examples:

Name	EvtGen code	PDG code
$\pi(2S)_0$	20111	100111
$\pi(2S)_+$	20211	100211
$\eta(2S)$	20221	100221
$\psi(2S)$ [ψ']	30443	100443
$\psi(3770)$	40443	30443
$Upsilon(2S)$	30553	100553
$Upsilon(3S)$	60553	200553
$Upsilon(4S)$	70553	300553

Solution I (near term):

- Hard code all PDG particle codes into ParticleDB.
- Kludge particle code translation for EvtGen interface to account for particles not in PYTHIA.
-

Solution II (long term):

- Change ParticleDB function to read a text file.
- Supplement StdHEP translation for PYTHIA.
-

Need someone to work on long term solution!

Outstanding questions:

- Are the particle properties the same among the different MC generators/decayers (HERWIG, PYTHIA, NLO, EvtGen, QQ)?
 - * kinematics
 - * cross sections
 - *
- How do we ensure that we have the correct particle properties?