CB-Note 1XX

LEAR Crystal Barrel Experiment, PS197

Event-Generator for $\bar{p}d$-annihilations

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1 Introduction

This note describes the Event-Generator for $\bar{p}d$-annihilations. This Deuterium-Generator uses the BIGBANG-Generator of our standard Monte-Carlo. Due to our measured spectator-momentum distributions, c some modifications are necessary.

As we know from the presentation of K. Peters in July 1991, we have to keep in mind the strong correlation between the number of produced pseudoscalar mesons and the distribution of the spectator-momentum. Only for the Pontecorvo-like reactions, the absolute momenta are fully determined and only the directions of the outgoing particles are free. In the case of more than two mesons, produced in the primary decay, we have to use our measured spectator-momentum-distribution and reproduce this behaviour. The measured distributions were numerically integrated and normalised to one. Using equally distributed random numbers between 0. and 1. and the inverse function of the integration, the measured distribution will be reproduced very well. These operations are realized via Look-Up-tables and the granullarity of these tables is based on the precision of the measured distributions.

For the decay of the remaining $\bar{p}p$- or $\bar{p}n$-system the standard BigBang-Generator is used, but with an extra Lorentz-Transformation. Because of the spectator-particle, the remaining system has a momentum not equivalent zero and BIGBANG generates only particles in the rest-frame of the decaying system.

Spectator-particle and the mesons produced in the primary decay are stored at the first vertex, first the mesons and then the spectator-particle.

2 History

The Deuterium-Monte-Carlo is part of the Crystal-Barrel-Monte-Carlo and the first version is included in the general MC-version 1.4X/XX.

- Deuterium-Monte-Carlo, Version 1.0
  - Measured Spectator-distributions were derived with default calibration-tables (i.e. of old runs)
  - The same spectator-distributions are used for protons and neutrons, because of low statistics for the spectator-proton-distributions.
  - Granullarity of the spectator-distributions : 6 $\frac{MeV}{c}$
  - Only the number of particles in the datacard determines the number of produced pseudoscalar mesons (resonances !!)

3 Datacards

There are only two datacards, which we have to modify for the Deuterium-Monte-Carlo. The main difference to the standard $\bar{p}p$ Monte-Carlo occurs in the KINE-Datacard.

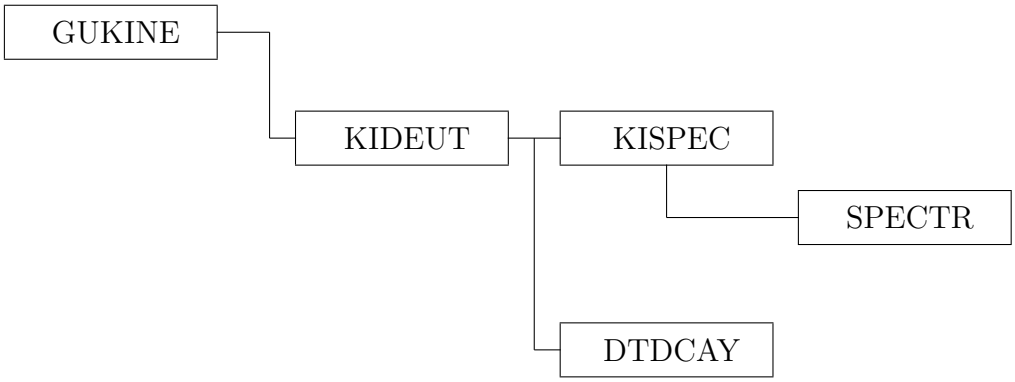
KINE i1,r1.....rn

- i1 = 31, then The Deuterium-Event-Generator KIDEUT will be called
- r1 = 0. (use normal FOWL generator)
  = 1. (use hit/miss Monte Carlo)
- r2 = p_z-momentum of the beam, should be zero for Deuterium-MC
- r3 = Number of specified particles $\rightarrow$ spectator-particle included
- r4 = type of spectator particle (use geant-id's), i.e. proton = 14. and neutron = 13.
- r5 = particle type for first specified particle
- r6-rn = remaining particle types for r3 $\geq$ 3.

Then only the Datacard TGLH for the type of target has to change from LH_2 to LD_2.

TGLH 'LD2 ' '1991'

4 General Structure



For further questions, remarks and new ideas please contact me via electronic mail. My mailadress is : STRASSBURGER@VIPMZE.PHYSIK.UNI-MAINZ.DE .