Herwig++ 2.0β Release Note

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Abstract

A new release of the Monte Carlo program Herwig++ (version 2.0β) is now available. The main new feature is the extension of the program to include simple hadron-hadron processes including the initial-state parton shower.
1 Introduction

The last major public version (1.0) of Herwig++ was reported in detail in [1]. In this note we describe the main modifications and new features included in the latest public version, 2.0/β.

Please refer to [1] and to the present paper if using version 2.0/β of the program.

1.1 Availability

The new program, together with other useful files and information, can be obtained from the following web site:

http://hepforge.cedar.ac.uk/herwig/

2 Hadron-Hadron Collisions

The main new feature of this version is the extension of the original e⁺e⁻ program to hadron-hadron collisions. In the current version only simple Drell-Yan processes (both W and Z production) are supported together with the initial-state shower from the incoming partons, using the algorithm described in [2]. The outgoing partons radiated from the incoming lines are not currently showered, there is no model of the underlying event or matrix element correction for Drell-Yan processes. However, this version does produce hadron-hadron events which can be used to test the integration of the program into experimental simulations and gives an improved $p_T$ spectrum of the gauge bosons with respect to the FORTRAN HERWIG 6.5 without matrix element corrections. The $p_T$ distributions of Z and W bosons, at the Tevatron and LHC, are compared to HERWIG6.5 in Figs 1 and 2 respectively.

3 Other Changes

- A number of changes to the decays and hadronization have been made to improve the stability of the code. As a result of these changes the default strange quark weight $\text{PwtSquark}$ has been returned to its natural value of 1.0, which increases the amount of K mesons produced and improves the agreement with LEP data.

- The documentation has been changed to use DOXYGEN and is available either via the Herwig++ web-page or with the code. In addition information on using the program has been added to the Herwig++ wiki.

- The build procedure has been significantly improved and now uses the GNU autotools.
Figure 1: The $p_T$ spectrum of $\gamma^*/Z$ bosons produced at (a) the Tevatron and (b) the LHC using Herwig++2.0$\beta$ compared with HERWIG6.5 with and without matrix element correction. In both cases the mass of the Drell-Yan pair was required to be greater than 20 GeV.

Figure 2: The $p_T$ spectrum of $W$ bosons produced at (a) the Tevatron and (b) the LHC using Herwig++2.0$\beta$ compared with HERWIG6.5 with and without matrix element correction.

- A large library of helicity classes has been included to make implementing additional matrix elements much simpler.
- Many models for hadronic decays have been added which are currently not used by default but can be switched on if needed (see the web-site for how to do this).

References