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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.

Contents

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, 2.0β.

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

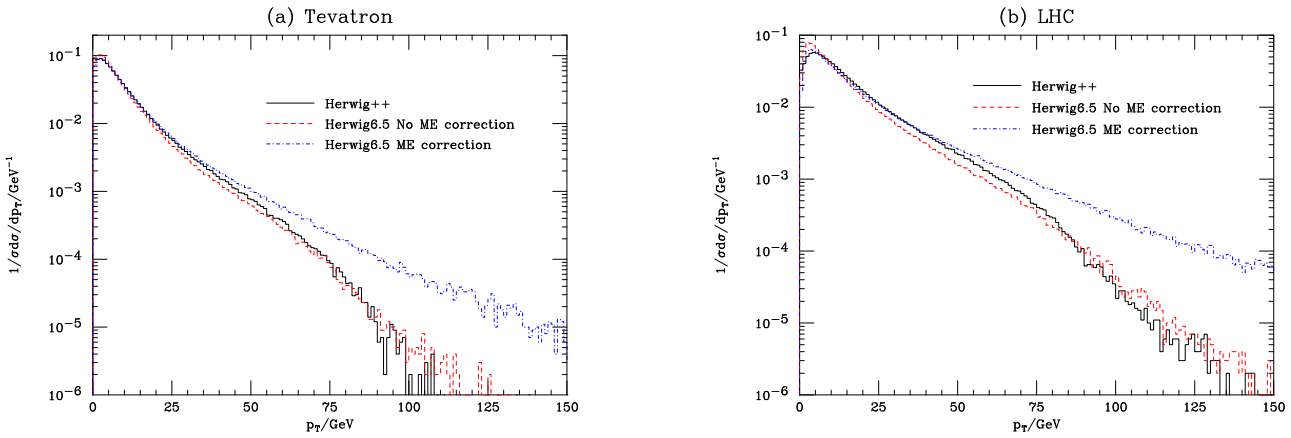

Figure 1: The p_T spectrum of γ^*/Z bosons produced at (a) the Tevatron and (b) the LHC using Herwig++2.0β compared with HERWIG6.5 with and without matrix element correction. In both cases the mass of the Drell-Yan pair was required to be greater than 20 GeV.

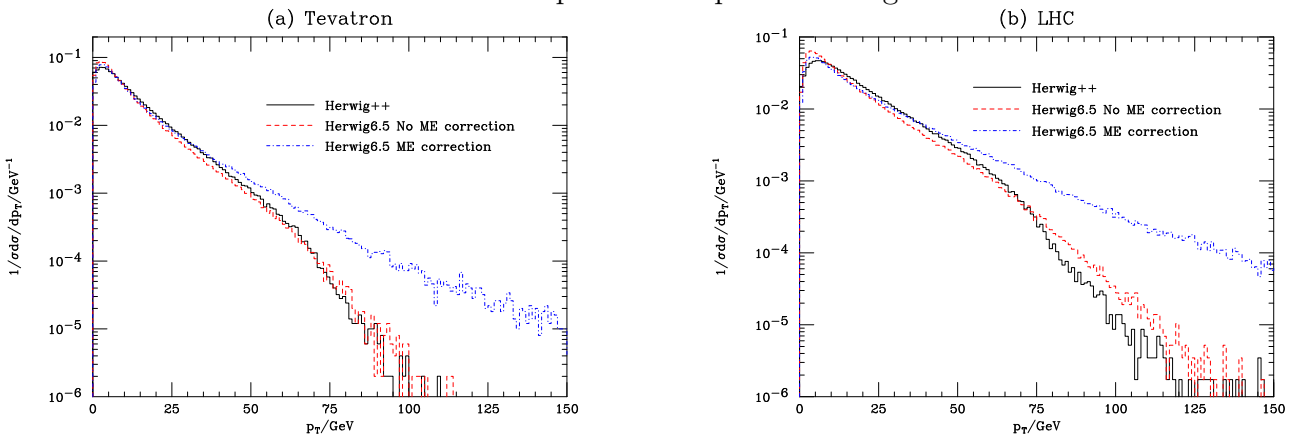

Figure 2: The p_T spectrum of W bosons produced at (a) the Tevatron and (b) the LHC using Herwig++2.0β compared with HERWIG6.5 with and without matrix element correction.

- 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

[1] S. Gieseke, A. Ribon, M. H. Seymour, P. Stephens and B. Webber, JHEP **0402** (2004) 005 [arXiv:hep-ph/0311208].

[2] S. Gieseke, P. Stephens and B. Webber, JHEP **0312** (2003) 045 [arXiv:hep-ph/0310083].

[3] **HERWIG 6.5**, G. Corcella, I.G. Knowles, G. Marchesini, S. Moretti, K. Odagiri, P. Richardson, M.H. Seymour and B.R. Webber, JHEP 0101 (2001) 010 [arXiv:hep-ph/0011363]; [arXiv:hep-ph/0210213].