Appendix B

Simulation programs

The simulations for BRAHMS are carried out using a package built on the GEANT program library from CERN. It has been the goal to deal with the different detector components in a common and modular manner. By design, detector and magnet configuration and parameters can be changed with ease. The present version uses the 3.21 version of the library. The description of most detectors is quite simple. The tracking detectors are given as simple gaseous volumes and the TOF detectors as scintillator slats. Thus none of the supporting structures are included. These will in most cases not have a direct view to the collision point and are not expected to have any significant influence on the simulation results obtained so far.

The input to the simulations have mainly been "data" from the event generators FRITIOF and VENUS. The predicted multiplicities from the two models are quite different (see, e.g., Reference 1) underlining the uncertainty in the particle densities with which the RHIC detectors must deal. The collaboration has chosen to use mainly the VENUS input since it represents the more difficult situation for the detectors.

The output from the simulations are used to investigate background sources, rates, etc. by a fairly simple analysis. This is the method used for most tables of background properties in the report.

Alternately the output was used as input to the track reconstruction program SONATA developed for the forward spectrometer. The Entity-Relation model is used to describe the data structures for detectors, hits, tracks, etc. It is implemented using the ADAMO[2] package. The use of this methodology makes modifications to detector descriptions and data structures easy and safe to deal with. Briefly, this program digitizes the tracks going through the detectors T1-T5, reconstructs track segments from the drift chamber wire-information or the TPC-pad ADC and time information. It then connects track segments from T3, T4, and T5 to determine the momenta of the tracks, projects these back to T2, and to the interaction point. The configuration of a given detector, e.g. number of wire planes, wire distances in T5 can be easily modified, a feature which is used to optimize the performance of the detector.

References

1. F. Videbaek, M. Ye, T. Throwe, T. Ludlam, RHIC/Detector Note-2, BNL, 1992.

2. S.M. Fisher, The ADAMO Data System, CERN/RAL, 1992.