

AMPT

A Multi-Phase Transport Model for Relativistic Heavy Ion Collisions

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Zhigareva N., 23.04.13

AMPT model

Use:

- **HIJING** (Heavy Ion Jet Interaction Generator) – for generating the initial conditions
- **ZPC** (Zhang's Parton Cascade) – for modeling partonic scatterings
- **Lund string fragmentation model** or **quark coalescence model** – for hadronization
- **ART** (A Relativistic Transport model) – for treating hadronic scatterings.

Input parameters

Key parameters:

- \sqrt{s} , GeV
- N events – total number of events
- A number of target/projectile
- B min, B max – impact parameters (in fm) for all events
- Choice of parton-hadron conversion scenario (AMPT model, AMPT with string and others)
- Parameters for Lund fragmentation
- Quenching flag (on/off)
- K short decay flag, other flags

Output parameters

Output file: ampt.dat, contains:

- Event number
- Impact parameter
- Total number of participants n . in proj.
- PYTHIA particle ID number
- 3 momentum P_x, P_y, P_z
- Space-time coordinates
- ...

Convert files to ROOT

List of files .dat → macro.C for convert .dat to root.C → working with ROOT structure.

The image displays a desktop environment with three windows illustrating the process of converting a data file to a ROOT macro.

- Left Window (Terminal/Editor):** Shows a list of data points from a file named `dndy_ch.dat`. The data consists of two columns of floating-point numbers, representing x and y coordinates.
- Middle Window (Canvas):** Displays a scatter plot of the data points. The x-axis ranges from -10 to 10, and the y-axis ranges from 0 to 220. The plot shows a distribution of points that is roughly bell-shaped, centered around x=0, with a peak around y=100.
- Right Window (Emacs Editor):** Shows a C++ macro named `test1.C` designed to read the data from the file and plot it using ROOT's `TTree` and `TH1F` classes. The macro includes the following code:

```
printf(" found %d points\n",nlines);
in.close();
f->Write();*/
//_____

TString dir = gSystem->UnixPathName(gInterpreter->GetCurrentMacroName());
dir.ReplaceAll("test1.C","");
// dir.ReplaceAll("/./","/");
gStyle->SetOptStat(1111);
TFile *f = new TFile("test1.root","RECREATE");
TH1F *h1 = new TH1F("h1","dndy",100,-10,10);
TTree *T = new TTree("ntuple","data from ascii file");
Long64_t nlines = T->ReadFile(Form("%sdndy_ch.dat",dir.Data()),"x:y");
printf(" found %lld points\n",nlines);
T->Draw("y:x");
T->Write();

TH1F *h2 = new TH1F("h2","dndy",100,-10,10);
for(Int_t i=0;i<nlines;i++){
T->Draw("y:x>>h2","nlines<50");
}
```


AMPT

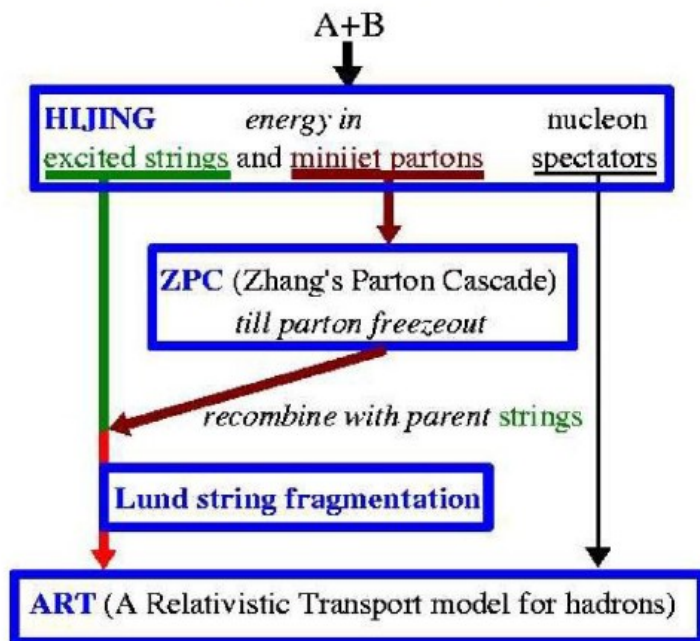
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« Pb-Pb collisions at $\sqrt{s_{NN}}=2.76$ TeV in a multiphase transport model » arXiv 1101.2231

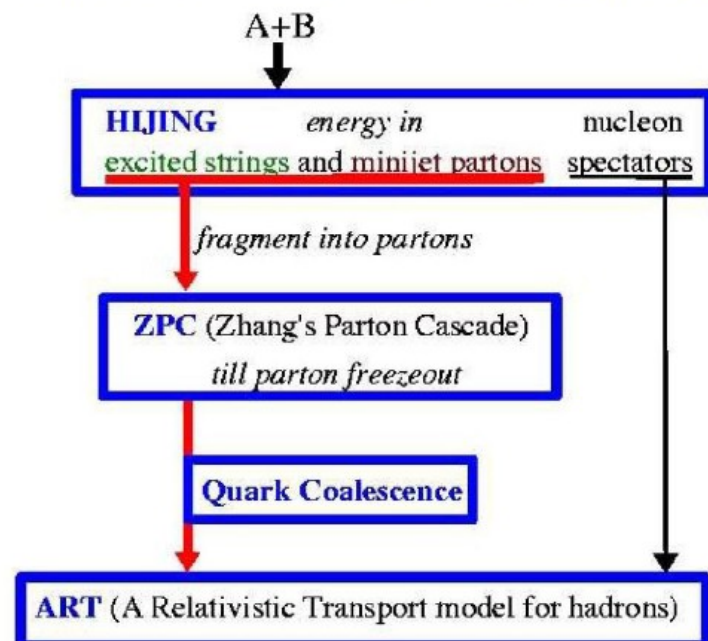
« A Multi-phase transport model for relativistic heavy ion collisions. »
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An hybrid model, 2 versions

Structure of the default AMPT model

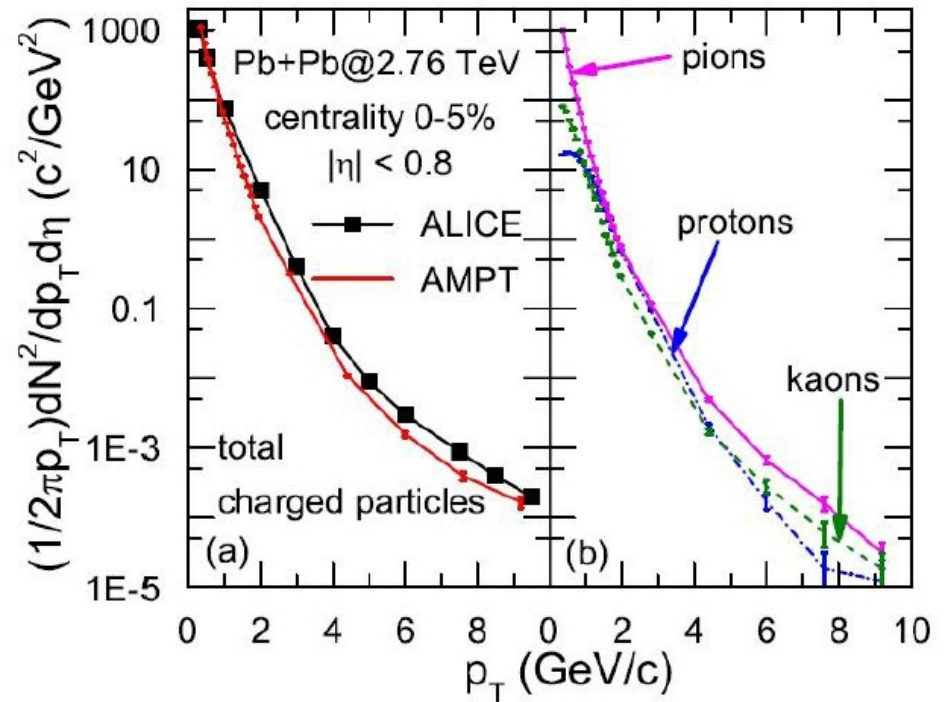
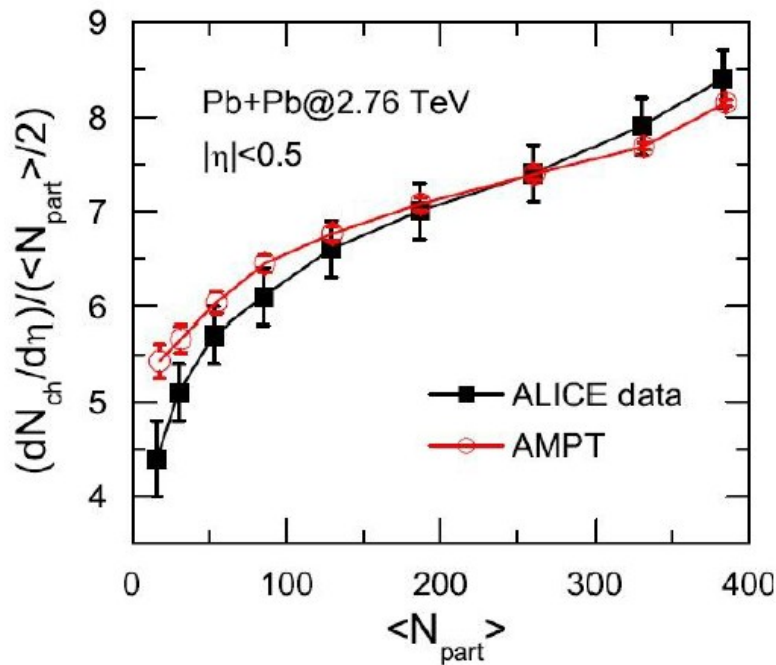


Structure of AMPT model with string melting



AMPT

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