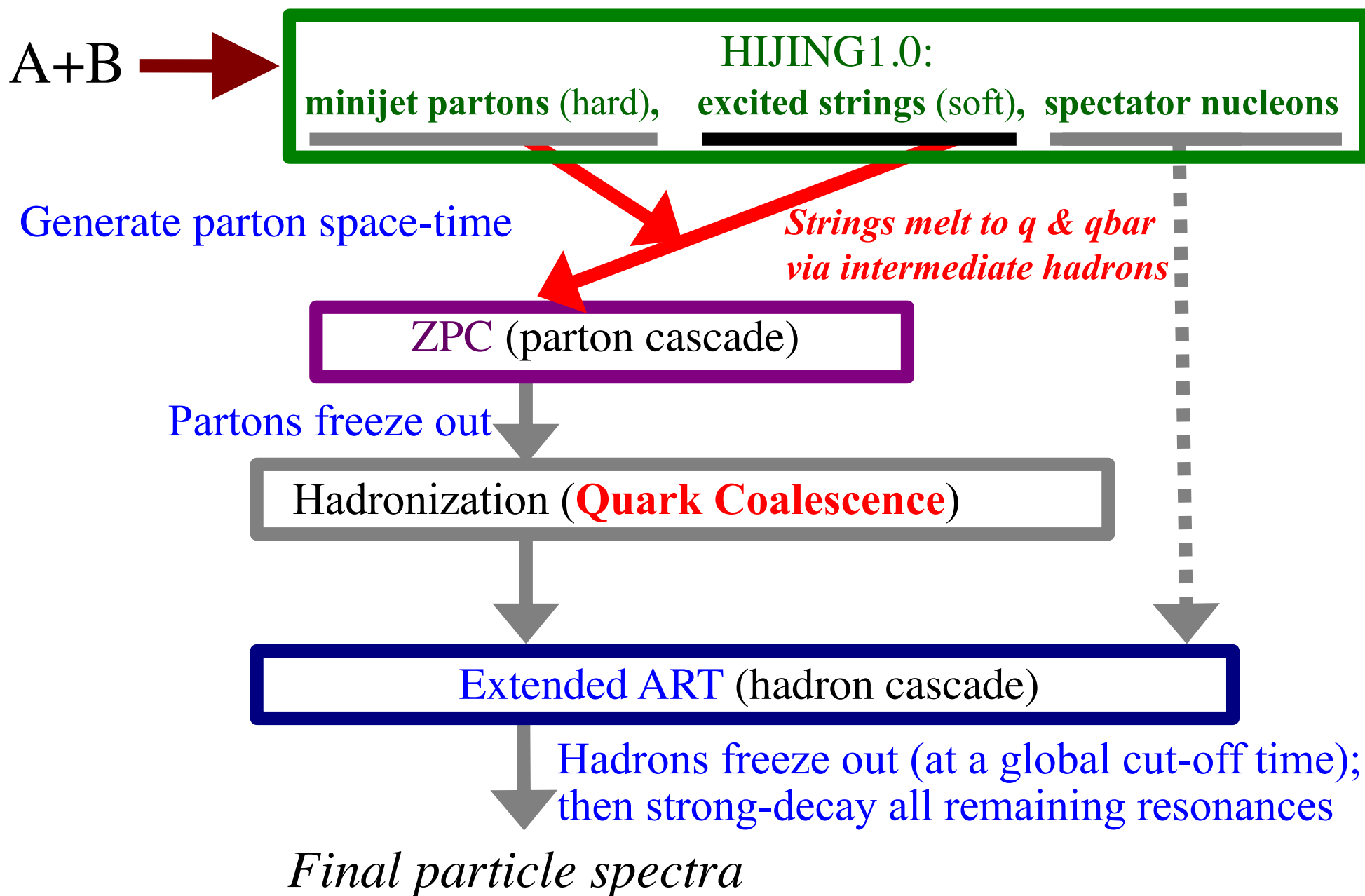


A Multi-Phase Transport (AMPT) and Output Formats

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Structure of AMPT v2.xx (String Melting version)



Public access

First public release of AMPT source codes: ~ April 2004.

Detailed physics descriptions in the long paper:

ZWL, Ko, Li, Zhang & Pal, PRC 72, 064901 (2005).

"Official" versions v1.11/v2.11 (2004) and v1.21/v2.21 (2008)
are available at

<http://myweb.ecu.edu/linz/ampt/>

(also available at <https://karman.physics.purdue.edu/OSCAR-old/>)

More versions, including later test (t) versions, are available at
the above ECU site:

<http://myweb.ecu.edu/linz/ampt/>

Input file *input.ampt*

.....

0 ! optional OSCAR output (D=0,no; 1,yes; 2&3,more parton info)

.....

%%%%%%%% Further explanations:

.....

ISOFT: 1 Default,
4 String Melting.

.....

ioscar: 0 Default,
1 Write output in the OSCAR format,
2 Write out the complete parton information
(ana/parton-initial-afterPropagation.dat)
right after string melting (before parton cascade),
3 Write out several more files on parton information (see readme).

.....

Hadron output file *ampt.dat*

| Event# | Test# | Particle# | b(fm) | Npart1 | Npart2 | Npart1_el | Npart1_inel | Npart2_el | Npart2_inel |
|--------|--------|-----------|---------|--------|--------|-----------|-------------|-----------|-------------|
| 1 | 1 | 1750 | 10.0000 | 37 | 32 | 7 | 30 | 3 | 29 |
| 22 | 0.065 | -0.240 | -0.024 | 0.000 | -0.10 | -0.02 | -0.08 | 1.00 | |
| 22 | -0.188 | 0.142 | -0.038 | 0.000 | -0.13 | 0.09 | -0.13 | 1.00 | |
| 22 | 0.043 | -0.004 | -0.019 | 0.000 | 2.39 | 3.47 | -0.33 | 1.00 | |
| 111 | 0.152 | -0.152 | 0.329 | 0.135 | -1.62 | -1.16 | 0.25 | 1.40 | |

Particle ID (PYTHIA) Final momentum mass Final position & time (at kinetic freeze-out)

Units: E/P/m in GeV, x/t in fm

Parton output file *zpc.dat*

| | Event# | EventIteration# | Particle# | b(fm) | Npart1_el | Npart1_inel | Npart2_el | Npart2_inel | | |
|------------------------------------|----------------------|-----------------|----------------|--------|-----------|-------------|---|-------------|------|--|
| | 1 | 2 | 442 | 8.0000 | 2 | 82 | 1 | 83 | | |
| For default version: | 21 | 0.368 | 2.459 | -6.880 | 0.000 | 0.85 | 2.98 | -6.79 | 7.16 | |
| | 21 | 6.456 | -1.633 | 1.884 | 0.000 | 2.60 | 2.81 | 0.18 | 0.68 | |
| | | | Final momentum | | | mass | Final position & time (at kinetic freeze-out) | | | |
| | Particle ID (PYTHIA) | | | | | | | | | |
| For string melting version: | 1 | 0 | 5492 | 7.3000 | 5 | 103 | 5 | 91 | | |
| | 1 | -0.842 | 1.584 | -0.264 | 0.010 | -1.47 | 5.04 | -0.26 | 1.94 | |
| | 1 | -0.304 | -0.942 | -1.188 | 0.010 | -1.54 | 1.86 | -2.12 | 3.63 | |

readme

Examples (from the *readme* file):

6/2009 test version v1.25t1/v2.25t1:

- * ... renamed as ana/[parton-initial-afterPropagation.dat](#), which outputs the complete information of partons that enter the parton cascade; i.e., it gives the minijet gluon information for default runs, or the quark and anti-quark information after string melting (before parton cascade) for string melting runs. This option is activated by setting `ioscar` to 2.
- * `ioscar=3` now enables the following output files in addition to ana/[parton-initial-afterPropagation.dat](#):
 - all parton collision history in ana/[parton-collisionsHistory.dat](#),
 - minijet initial condition in ana/[minijet-initial-beforePropagation.dat](#),
 - ana/[parton-after-coalescence.dat](#) for String Melting.

readme

Examples (from the *readme* file):

3/2009 test version v1.23/v2.23:

- * Enable users to insert user-defined hadrons to the hadron cascade.

10/01/2008 v1.21/v2.21:

- * We have added an option to write out the complete parton information right after string melting (before parton cascade).
Results are stored in `ana/initial_parton_sm.dat`

11/30/2004 v1.11/v2.11:

- * optional OSCAR output: if set to 1, outputs in OSCAR1997A format are written in ``ana/parton.oscar'` and ``ana/hadron.oscar'`.

OSCAR output file *hadron.oscar*

OSCAR1997A

final_id_p_x

AMPT 2.23 (StringMelting) (197, 79)+(197, 79) nncm 0.2130E+05 1

Center-of-mass energy/nucleon-pair is 200.000GeV

| | | | | | | | | | | | |
|---|------|--------------|--------------|--------------|--------------|--------------|--|--|--|--|--|
| 1 | 1750 | 10.000 | 0.000 | | | | | | | | |
| 1 | 22 | 0.649405E-01 | -.240387E+00 | -.236767E-01 | 0.250128E+00 | 0.000000E+00 | | | | | |
| | | -.973092E-01 | -.211804E-01 | -.757267E-01 | 0.100000E+01 | | | | | | |
| 2 | 22 | -.188148E+00 | 0.142216E+00 | -.382560E-01 | 0.238932E+00 | 0.000000E+00 | | | | | |
| | | -.128499E+00 | 0.909766E-01 | -.128090E+00 | 0.100000E+01 | | | | | | |
| 3 | 22 | 0.430664E-01 | -.442401E-02 | -.193810E-01 | 0.474332E-01 | 0.000000E+00 | | | | | |
| | | 0.239109E+01 | 0.347341E+01 | -.326876E+00 | 0.100000E+01 | | | | | | |
| 4 | 111 | 0.151752E+00 | -.151929E+00 | 0.328912E+00 | 0.415354E+00 | 0.135000E+00 | | | | | |
| | | -.161885E+01 | -.115882E+01 | 0.254801E+00 | 0.140000E+01 | | | | | | |

Particle ID
(PYTHIA)

Final momentum and energy

mass

Final position & time
(at kinetic freeze-out)

Tracking of parent hadrons

On resonance decays:

AMPT does not provide full info (*complicated for strong decays like rho, but this info is not needed if one uses the same reconstruction method as exp't*).

In some studies, we have tracked decay daughters of certain resonances (like phi, K*) to see which has scattered and thus cannot be reconstructed exp'tly.

On “primary” particles:

currently AMPT usually does not perform weak decays, e.g. D* is decayed, but not D⁰.

A possible solution to start with:

Code specifies a dedicated HepMC mode (which doesn't do any weak decays); instead RIVET/ROOT does it in post-processing;

this way it will be valid even though experiments have different definition of “primary” particles;

it is also conceptually simple since one has standard e-by-e record like data, which is enough for fair comparisons between model and data.