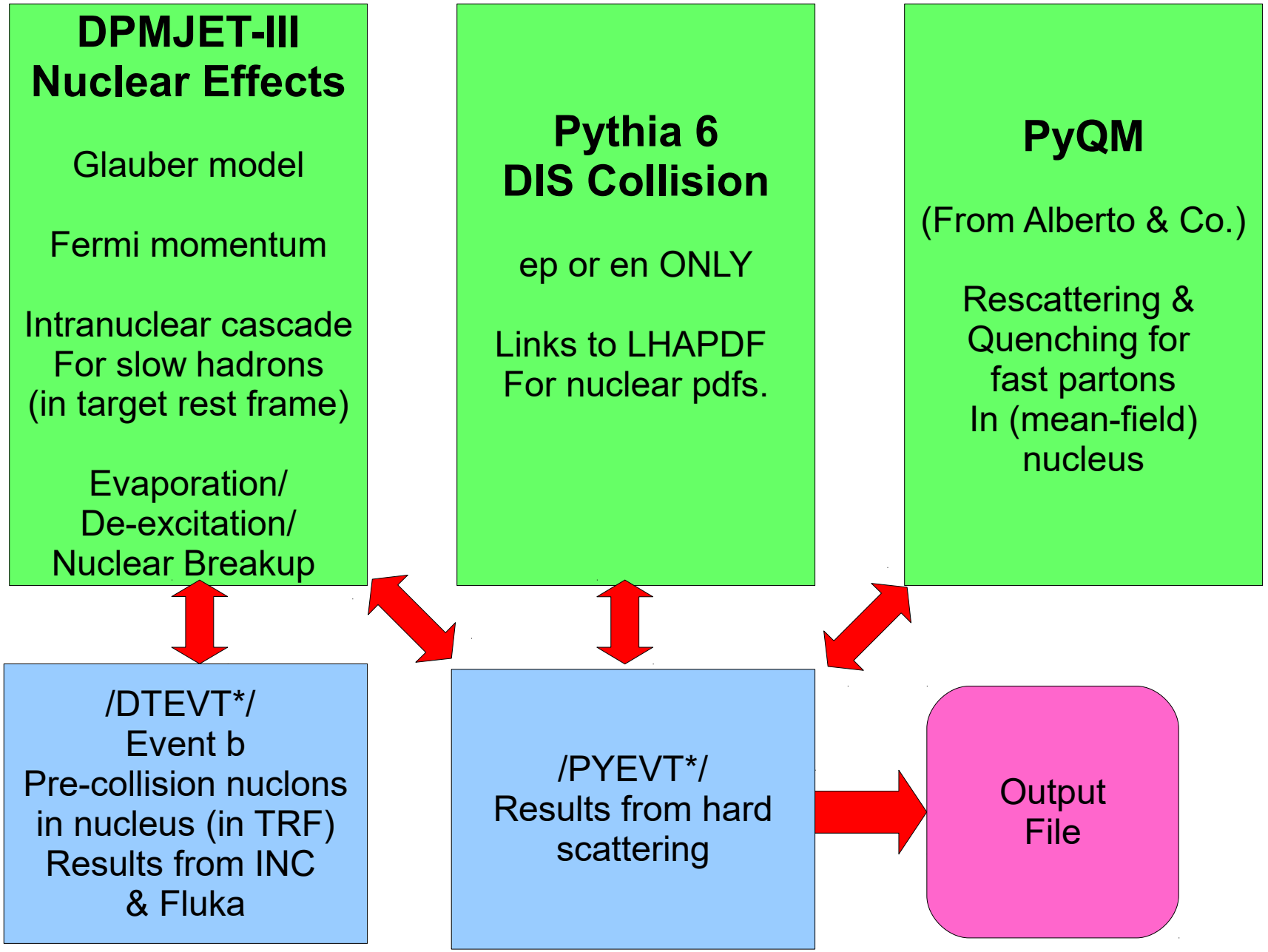
BeAGLE Update

MDB

22-Nov-2016

Three major pieces – Consistency!



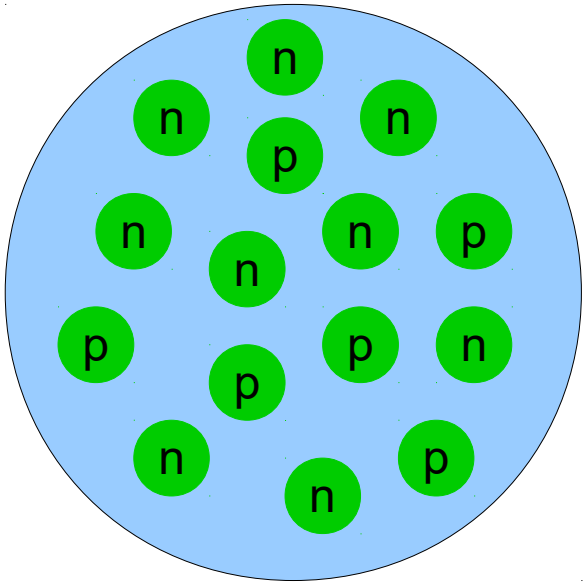
New issue for an eA collider!

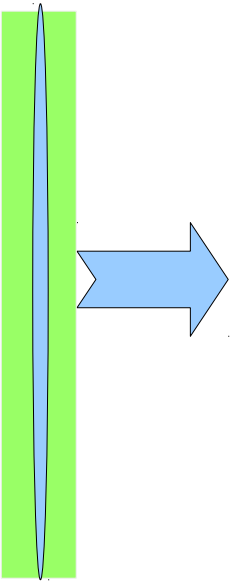
What is the momentum of the nucleon in a nucleus in the lab frame?
What is the mass of the proton inside the nucleus? Model dependent.
DPMJET & Pythia assume nucleons on-mass-shell.

Target Rest Frame

Laboratory Frame

M_{Au}=197 x 0.99983 amu, 1amu=0.931494GeV





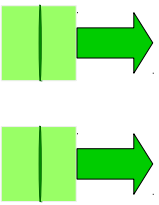
p_{zAu}=197 x **40 GeV/c**

$\gamma\beta = p_z/M$ =42.9491

NOT 40 GeV!

M_p=1.0073 amu p

M_n=1.0087 amu n



$p_z(p)=\gamma\beta M_p$ = **40.299 GeV/c**

$p_z(n)=\gamma\beta M_p$ = **40.355 GeV/c**

Recent changes to BeAGLE (also w/ Liang)

- Made Pythia consistent with DPMJET
  - Main collision is not ALWAYS ep, often en!
  - Nucleon and nucleus have same velocity (rapidity) in the laboratory frame. NOT same p/nucleon!
  - Remaining issue for later: Fermi-momentum ignored for struck nucleon.
- Made PyQM consistent with DPMJET
  - Use same position in nucleus for both
  - Use same rotational orientation (z along γ^*) for both
  - Remaining issue: Recoil momentum to nucleus.

Ongoing changes to BeAGLE

- Started removing (commenting out) unused parts of DPMJET
  - Unused collisions: pp, pA, AA, νA etc.
  - Note: if we need them, just use DPMJET3 directly.
  - Don't try to support all possible functionality.
- Actual rename & cleanup
  - Fixed bug where you could only run in the main directory!

Installation at JLAB

- I now have a JLAB lab-wide computer account.
- What actual computers should I use?
- Will I need a specific user account there?
- Should I get a JLAB email account?
- Where should I install BeAGLE?
- Where should Liang install Sartre?

Appendix.
Impact of Fermi Momentum

Proton in Au nucleus.
Target rest frame w/ electron beam along -z.
Boost to lab by γ,β: $\gamma\beta=42.95$

Consider $p_x=p_y=0$, $p_z=0.1$GeV

Naive: {M; 0, 0, 0}, $p_{zlab}=\gamma\beta M=40.3$ GeV,

Correct: $\{E=\sqrt{p^2+M^2};p_x,p_y,p_z\}$

$p_{zlab}=\gamma\beta E+\gamma p_z=44.8$ GeV

NOTE: γp_z term = 4.3 GeV!