Detector Effects to Consider

While many of the measurements we explore will have different requirements and constraints from the machine/detector, we should all try to address some key areas:

- Energy Dependence: What √s values can the measurement be performed at. Trade-offs between √s and luminosity?

- Acceptance: What pseudorapidity coverage is necessary for tracking, calorimetry, vertexing, PID, etc. What is minimum particle p_T that needs to be detectable

- Resolution: What momentum/energy/position resolution is needed from the tracking detectors and calorimeters? Is PID necessary – what level of particle separation is needed

Baseline Assumptions

As a physics working group, it is our job to determine what detector performance is needed given the measurements we want to do, however, we should all be aware / agree upon some realistic parameters so as to not waste time and resources simulating nonsense. We should consult with the relevant detector WGs as needed.

- Center of Mass Energies: Should consider √s and beam energies presented in https://wiki.bnl.gov/eic/upload/EIC.Design.Study.pdf .

- Acceptance: Can likely assume central tracking and calorimeter coverage will extend to ~±3.5 or 4 in pseudorapidity. Acceptance for low p_T particles will depend on magnetic field strength (which will also effect tracking resolution).

- Resolution: As mentioned, tracking resolution will depend on B field (and detector geo in forward region) but can probably start by assuming delta_p/p of between 1 and 10% depending on particle momentum and pseudorapidity. EM calorimetry around 10%/sqrt{E} + 1% except in electron-going side, where it will be much better (1.5%). Hadron calorimetry around 50%/Sqrt{E} + 10% (forward) to 75%/Sqrt{E} + 15% (mid). Should contact relevant detector groups for position resolution, EM towers may be around the size of Moliere radius