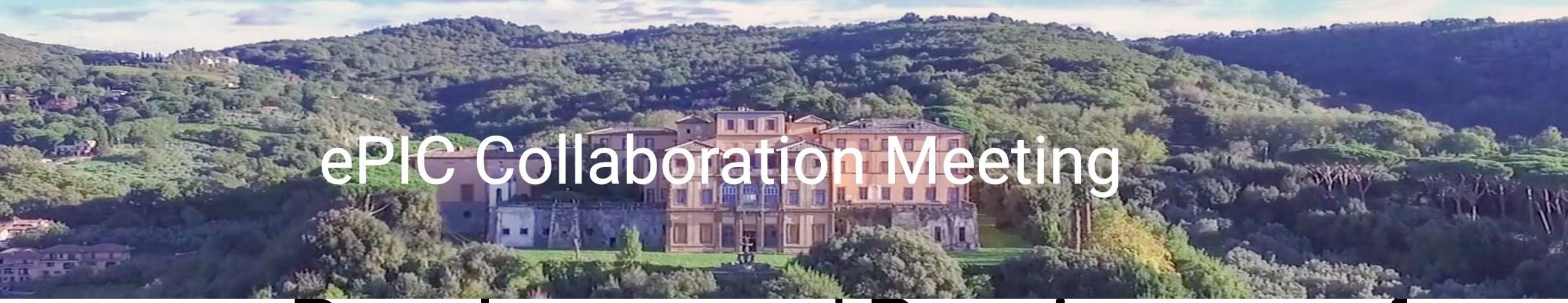

Data Inputs and Requirements for Physics Analysis

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Data Inputs → Requirements and Data Sets

- Many analyses do not require any additional data sets beyond Pythia8 at the associated beam parameters with some $Q^2 > 1$
  - Some requirement for higher Q^2 for Jets+HF/SIDIS
  - Other generators: Sartre, BeAGLE, eSTARlight
    - Generally translate in HepMC
- Inclusive
  - Reconstructed NC and CC Events (ep,eA)
  - Luminosity - (record of luminosity included with output files)
- Jets + HF – D^0-enriched sample → Pythia8 ep w/$Q^2 > 100$ GeV
  - Addition requests including D^0, Λc in ep and eA
- As noted, missing kinematics for SIDIS and exclusive processes

Exclusive Requirements → What is needed to perform "early science" analyses?

- **Preliminary run plan**
  - Year one: e + Cu or e + Ru 10x115 GeV/n
  - Year two: e + deuteron 10x130 GeV/n
  - Year three: e + p 10x130 GeV
  - Year four: e + p 10x250 GeV
  - Year five: e + He3 10x166 GeV/n
- **Needs from the accelerator (FF region)**
  - **General beam parameters at the IP** for the correct afterburner application (e.g. emittances).
  - Optics configurations for the various beam energies and species in the FF hadron region.
    - Cannot do credible reconstruction without the **correct magnet settings** to tune the matrices.
    - B0 magnetic field is fixed, while the other 6 magnets change – cannot simply scale with energy, otherwise the B0 performance w.r.t. the other detectors is artificially impacted (already a problem now for our ion beam settings).
- **Needs from the detector working group (dependent on the above information)**
  - **RP and OMD reconstruction matrices** for all beam energy configurations.
  - **Beta functions at RP** location to determine low-p_T acceptance (10σ cut).

Jets + HF: Dedicated Jet Class

- For many details, see Derek's talk in Jets+HF parallel session at: Derek Anderson Slides
- edm4hep has no jet-specific data type
  - Using edm4eic::ReconstructedParticle to hold the jet kinematic information
  - Jets are extended objects (have an area)
  - Jets also pick up background
- Conceptual issue: correspondence between jets and partons that is not necessarily one-to-one
- FastJet PseudoJet provides a starting point
- Multiple jet algorithms? Anti-kT vs Centuro
- Jet structure parameters like z_G?
  - One to many relationship allows access to constituents so can be calculated via analysis code → Might be worthwhile to add much later

Requirements

- Proposal of 10x expected statistics discussed in Analysis Coordination Meeting
- Consensus is that this should work for all analyses as conceived at this moment
  - One can always decrease statistics to determine realistic error bars
  - Factor of 3 decrease of uncertainty from “reality” is reasonable for ensuring systematic uncertainty is not driven by simulations statistics
- If use case requiring more than 10x the statistics is required, AC will inform S&C with justification
  - Some proposed dedicated HF samples may represent more than 10x statistics of “minimum bias” luminosity

Conclusions

- Most ”missing” information from the data structure is in the track ←→ cluster matching currently under construction w/Derek
  - Particle Flow (PF) charge under joint SCC&AC
- Physics analyses require information from more than one subsystem → Need some ongoing AC discussions on other “physics objects”
- Not discussed within the Analysis Meeting recently, but is important for the future is ”reco” PID
  - Many analyses are using the truth
  - eID however is available with work ongoing