Backgrounds & Fast Simulation

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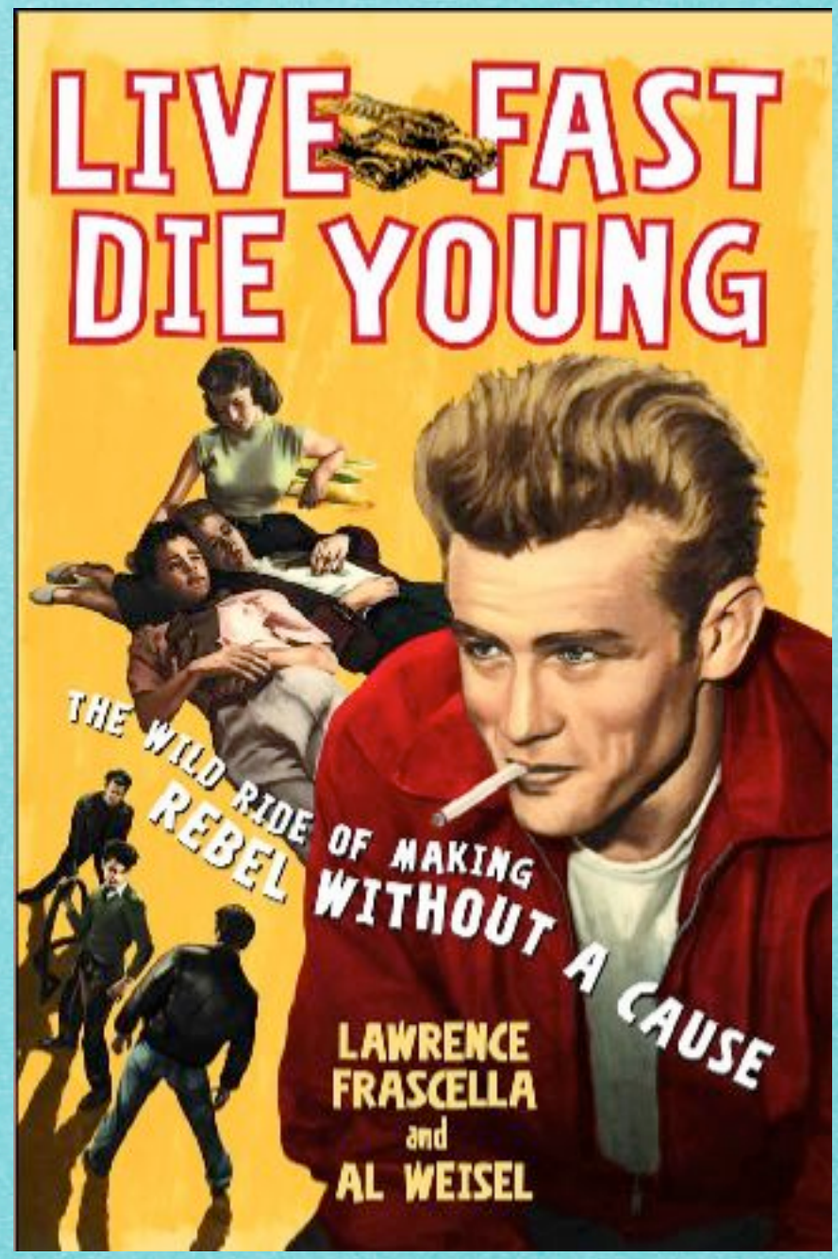
Some preliminary thoughts

Background Simulation Goals

- Optimize the Collider/ Collider Detector Interface/ Detector
  - Figures of merit:
  - Occupancies
  - Impact on performances
  - Radiation damages
  - Impact on some physical analyses:
    - neutrino reco. (extra tracks/neutral energy)

Fast Simulation Goal

- Detector & Collider optimization:
  - Figure of merit: precision/ sensitivity/reach of Physical measurements (Simulation)
  - Penalty function: costs/ reliability (experts judgement)

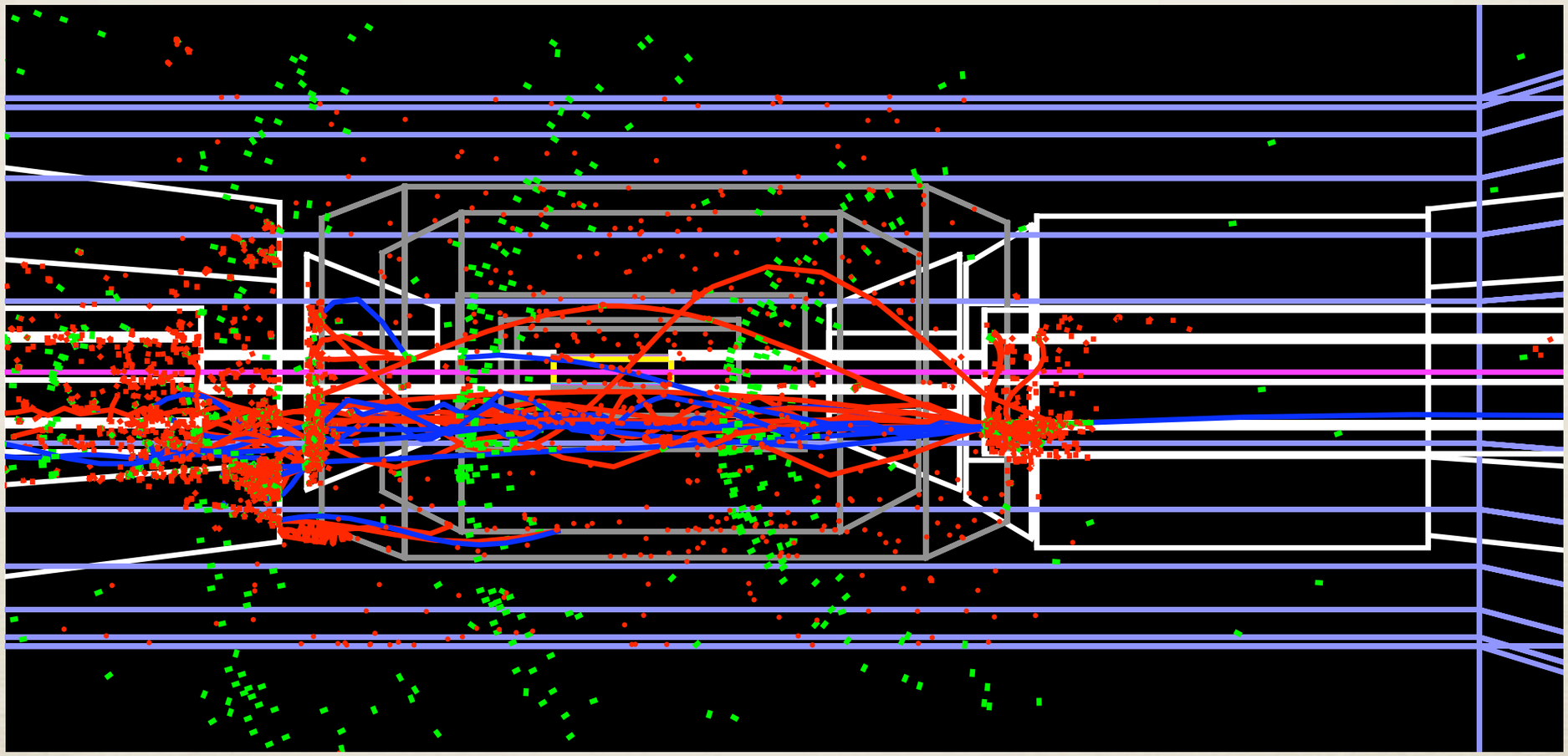


Fast Simulation - Background commonalities

- Both simulations requires a description of sub detectors geometries/material/granularity
  - A common language to describe the same detector for both simulations
- Some Physics analyses can be affected by machine backgrounds
  - Definition of a language to feed the fast simulation with machine backgrounds (sort of fast digi-mixing)

Fast background simulation?

* A typical Touschek background event



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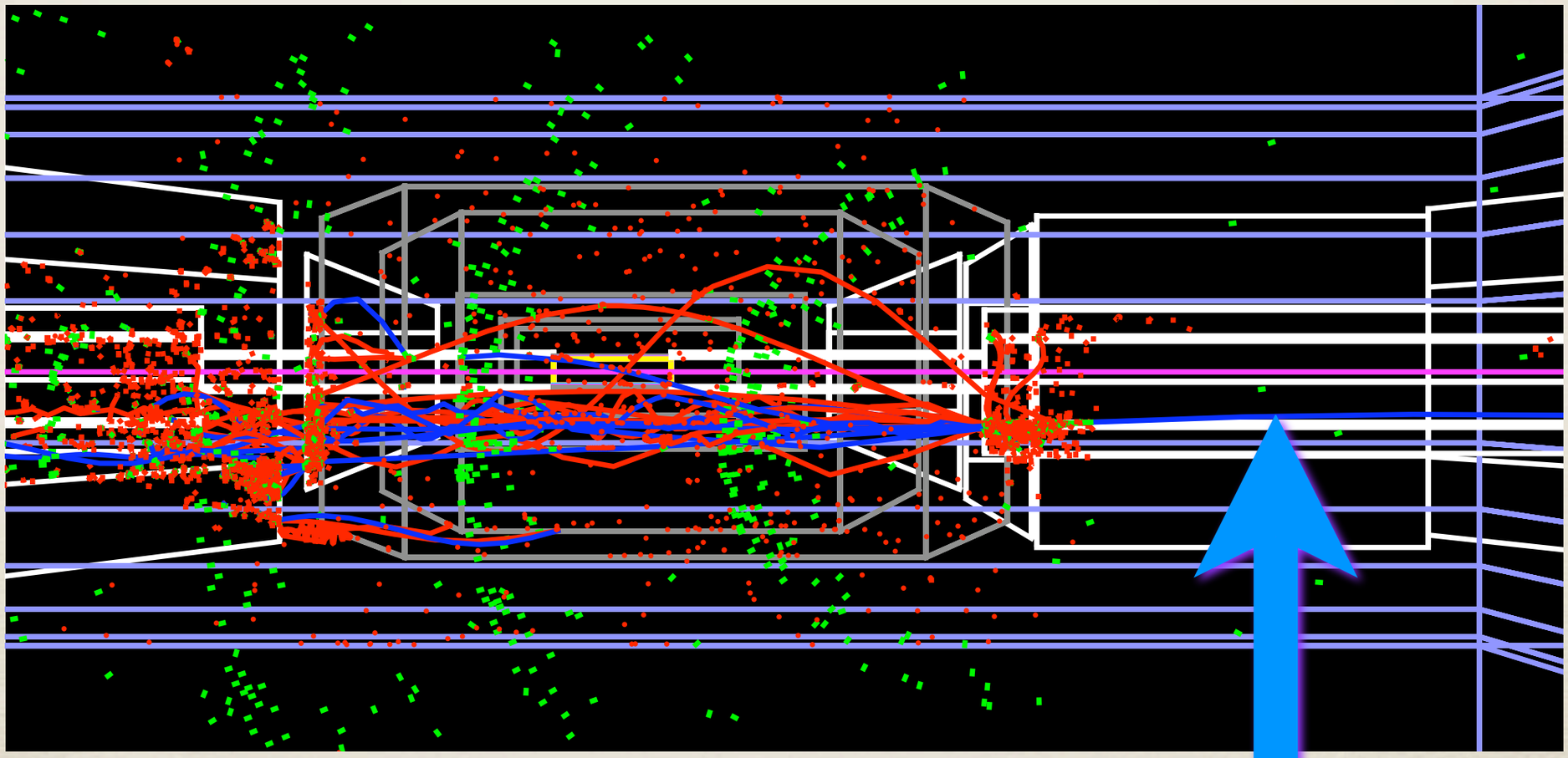

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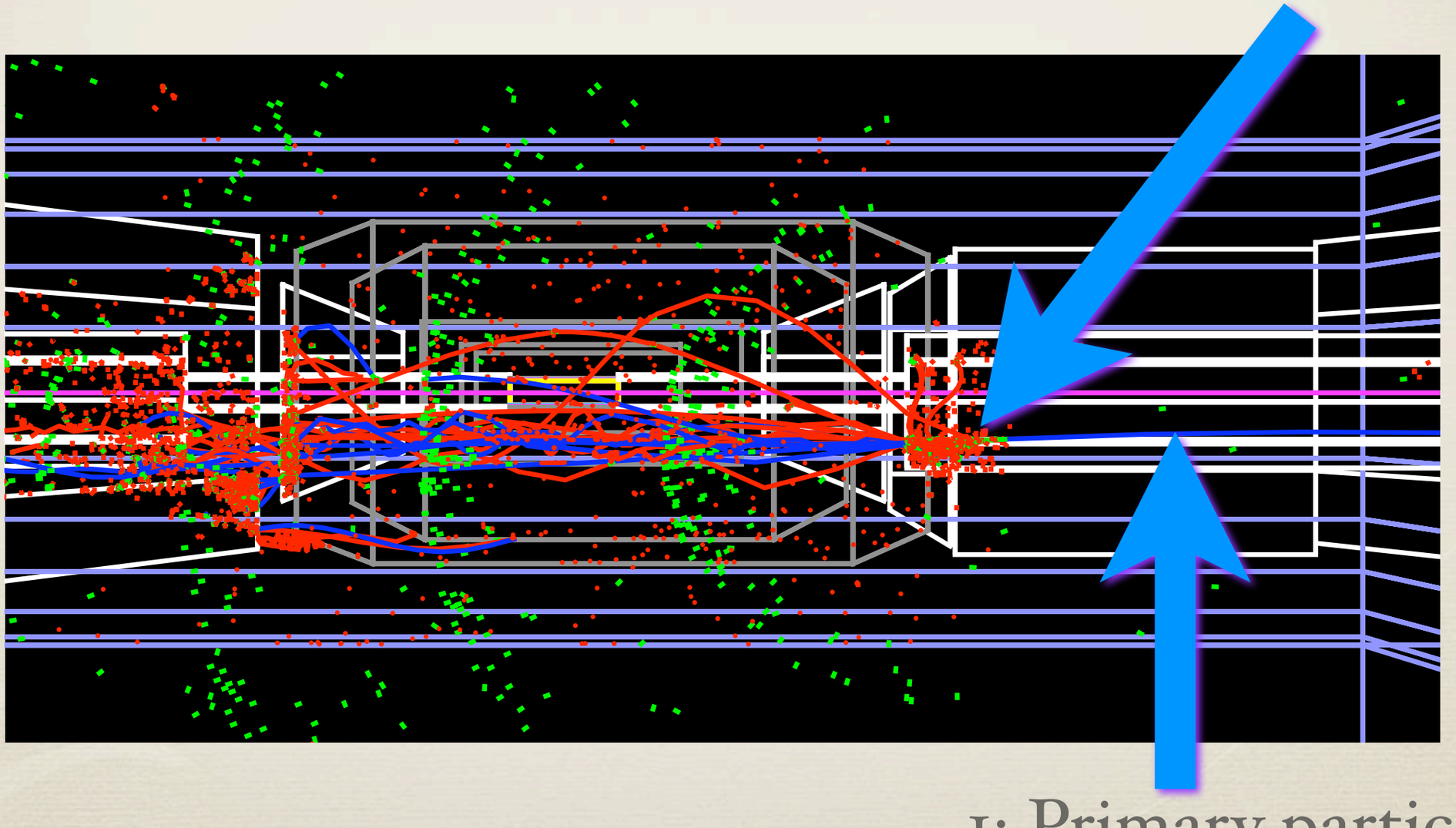

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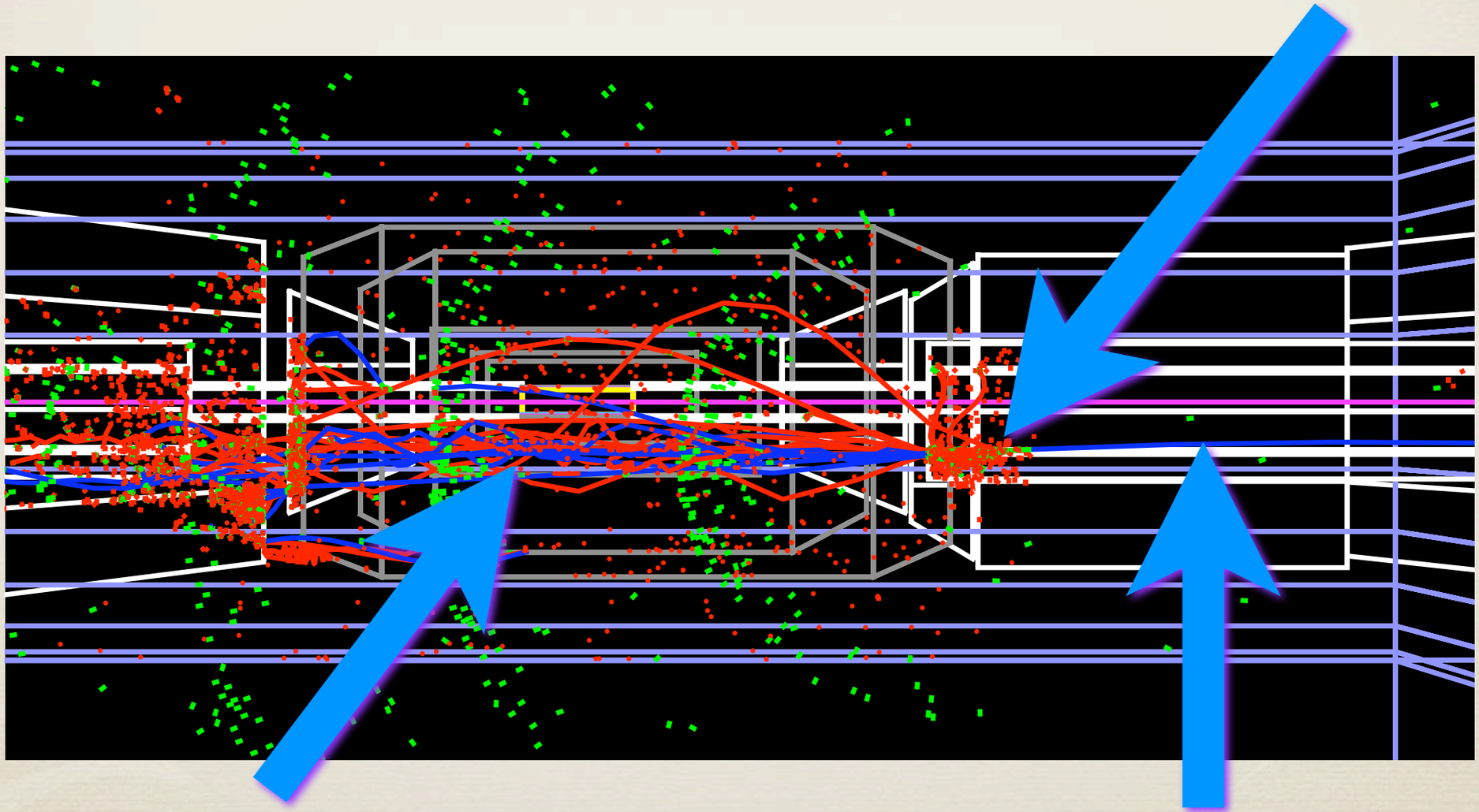

Fast Background Simulation

- A fast background simulation is meaningful only if a faithful model of the showers is present
  - Does Leelaps fulfill this requirements?
    - Can Leelaps be tuned for this purpose?
- Historic perspective: BaBar & PEP-II design was optimized without a full Geant simulation.
  - Single beam background is dominant
- SuperB dangerous background is driven by luminosity

Embedding of backgrounds in Fast Simulation

- Questions waiting for answers
  - Tracking:
    - Can Track-err reliably handle tracks originating far from the IP?
  - Calorimetry:
    - How the fast simulation will handle the calorimeter simulation?
  - Particle Id
    - Do we expect a background impact on PID for pions/kaons/muons ?

Conclusion & Open Questions (a single conclusion)

- A fast simulation code for background studies is a useful tool if it provides a faithful parametric model of the showering process.
- Does Leelaps/Bogus fulfill this requirement?
- How Leelaps/Bogus model the calorimetric cluster?
- How we will describe the detector?