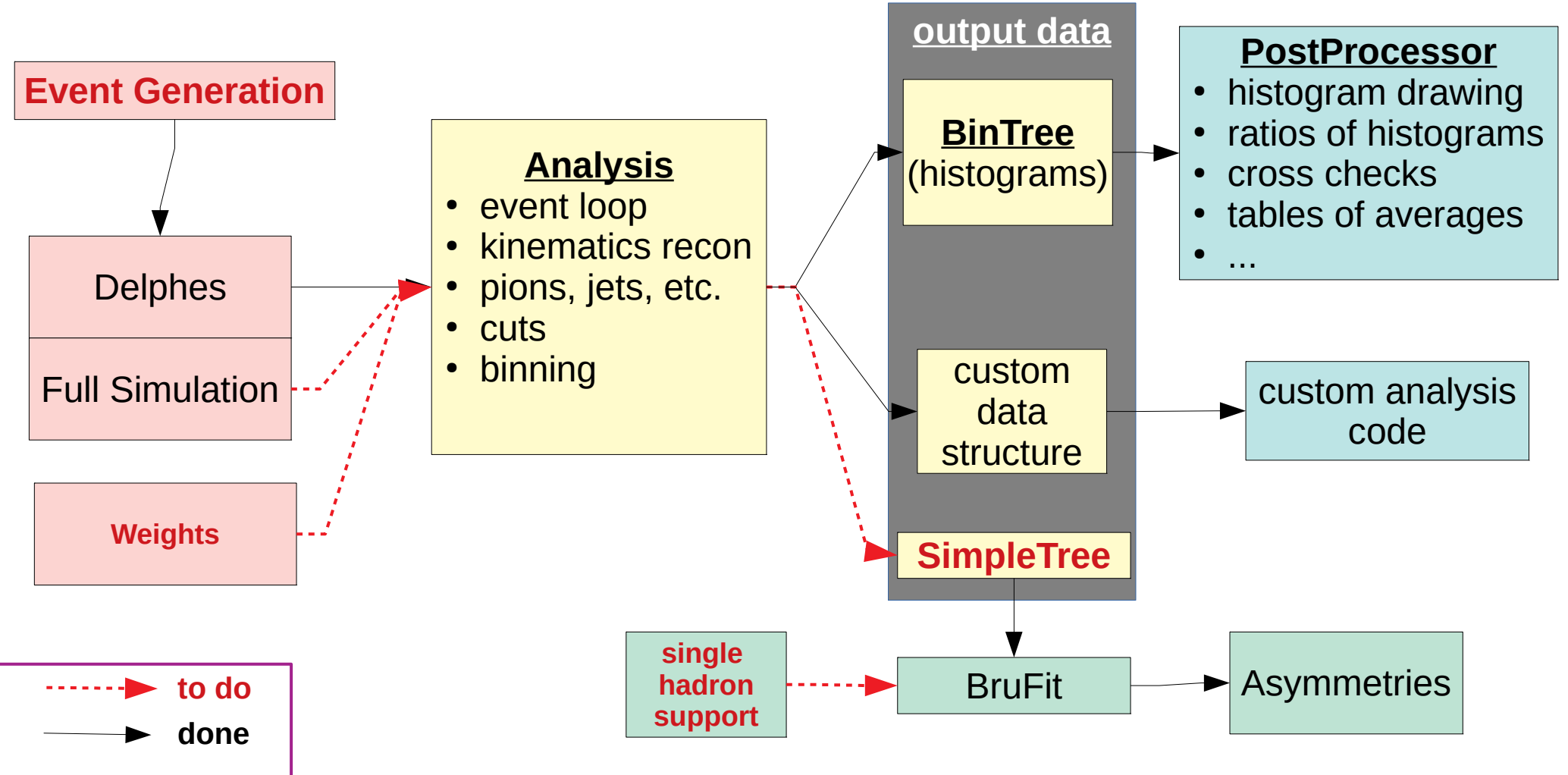
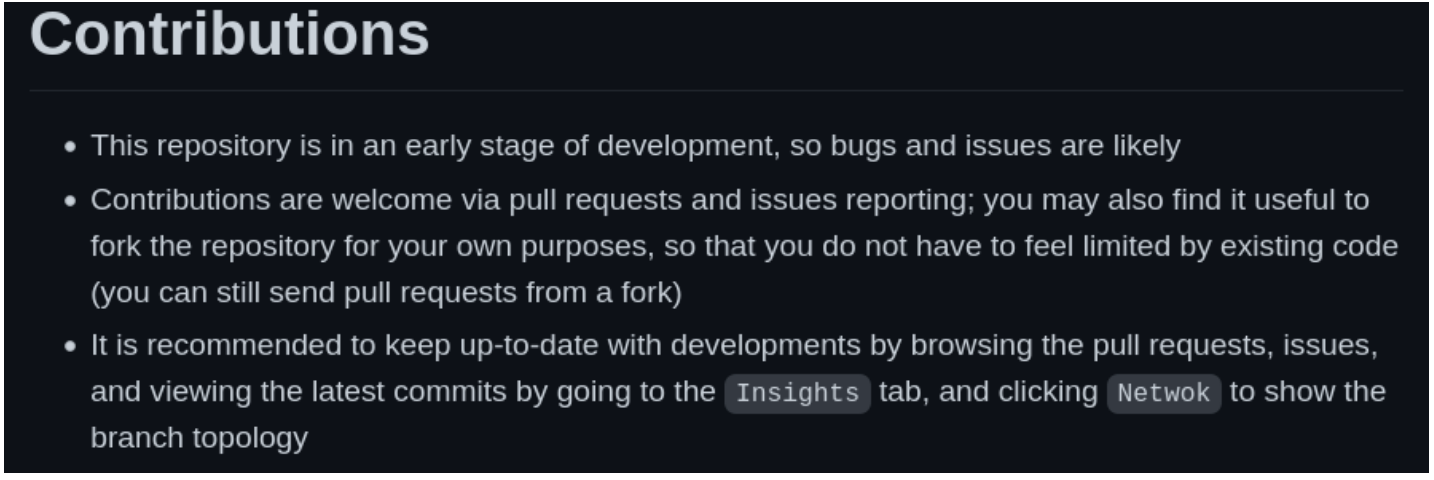
General purpose SIDIS simulation analysis software

https://github.com/c-dilks/largex-eic



Current Development Work

- **Sanghwa**: connect full simulation to Analysis
- **Duane**: weights, and consider adding his histograms
- **Connor**: continue working on jets implementation
- **Chris**: build SimpleTree and connect with BruFit; write BinTree class



Largex-eic → general purpose SIDIS simulation analysis software

- Arbitrary bins, where each bin of some variable x is specified by a CutDef:
  - Range: a<x<b or |x-a|<b
  - Minimum: x>a
  - Maximum: x<a
  - No cut

- 1 BinSet per kinematic variable, holding a list of arbitrarily defined bins, where you can either:
  - Manually define each bin
    - Example (note that overlapping bins is allowed!):
      - Bin 1: full y
      - Bin 2: y>0.03
      - Bin 3: y>0.05
  - Define an axis of bins: N bins between a and b
    - equal widths in linear scale
    - equal widths in logarithmic scale
    - any custom TAxis
    - example: (x,Q2) bins with equal width in log scale

- User specifies all bins and BinSets at the macro level

- BinTree stores all of the bins in a tree-like data structure (under construction, only a prototype is implemented currently)
  - The path from the top node to a leaf node gives the bin number of each BinSet associated with that leaf (cf. index of a multidimensional array)
  - Each leaf contains a Histos object:
    - Set of user-defined histograms (1,2, or 3D)
    - Set of CutDefs associated with this bin
    - Settings for histograms (e.g., log scale drawing)
    - You are welcome to add your own data structures here too

- No limit to number of BinSets, i.e. dimensions of your binning (current prototype has limits)
  - Careful of the curse of dimensionality
  - Sets of specific bins can be specified by taking only diagonal elements (bins) of the relevant dimensions

- BinSet and Histos are streamable to ROOT files
  - Analyze these with PostProcessor, which can do a variety of tasks:
    - Draw histograms in a specific format
    - Take ratios of histograms from two different bins
    - Dump averages of histograms for a set of bins and make a table
    - Add your own algorithms here
  - PostProcessor is also driven by macos, providing full bin-looping flexibility