(S)HMS Analysis Overview

- Overview: follow existing engine approach
  - Raw hit processing/decoding [need updates for new ADC/TDCs]
    - Option to dump information needed for detector calibration
  - Track-independent detector quantities
  - Tracking
  - Track-dependent reconstruction
  - Calculate efficiencies for each detector, reconstruction step
    - Robust algorithms which yield reliable measure of performance. Not tuned to specific experiment (e.g. extreme rates or backgrounds may require modified approaches)
  - Calculate 'basic' physics quantities for each event
  - Dump all information on luminosity, efficiencies, deadtimes, etc… for run
- Heavy emphasis on experiment-independent issues
  - Each experiment…
    - Must provide higher-level physics reconstruction
    - Must decide if they want to use more specialized efficiency calculations
    - Must determine efficiency of experiment-specific cuts
  - Most are fairly well standardized, with multiple 'default' options

(S)HMS Analysis Algorithms

- Algorithms
  - Current codes identical for HMS and SOS, with detailed detector layout defined by position/geometry parameter files
  - SHMS differs only by geometry; can use identical code
    - New code needed to implement additional functionality, e.g. w.r.t. multihit TDCs, flash ADCs, special benefits of quartz hodoscope.
  - Default efficiency calculations built in
  - Option to dump information for diagnostics, detector calibration
    - For some detectors, also have built-in calibration options

(S)HMS Tracking

- Tracking algorithm
  - Identify pairs: hits in overlapping wires (non-parallel planes)
  - Identify combos: group pairs that are within R~1.2 cm
  - Generate spacepoints: combine combos within R~1.2 cm
  - Generate stubs (single-chamber tracks) for all spacepoints
  - Find tracks: link stubs between two chambers
  - Apply drift time offset, determine L/R
    - Between planes where offset
    - Best chisquared for unmatched planes
  - Calculate track-dependent quantities for all surviving tracks
  - Select 'final' track

  - Various places where cuts can be applied. By default, only raw timing on DC TDC hits