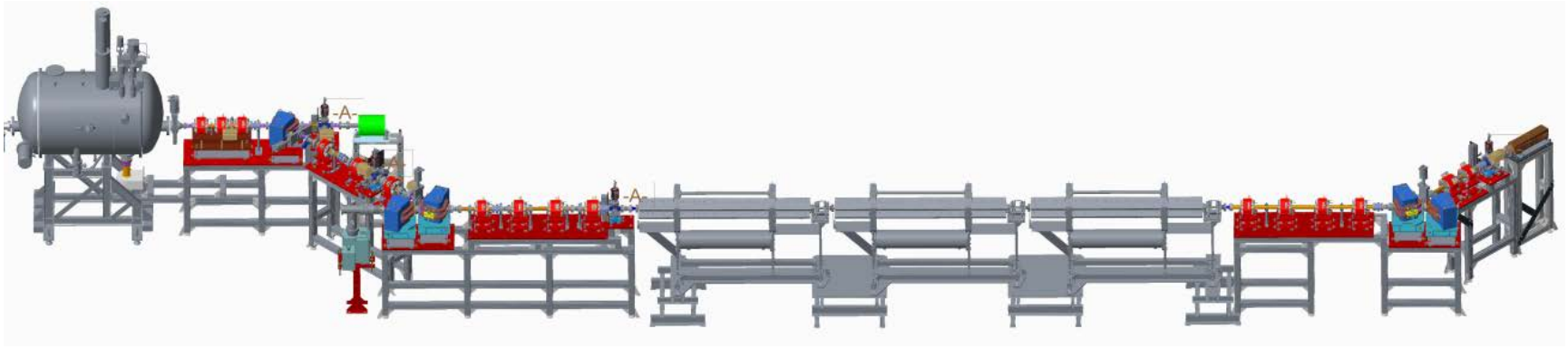
ApEx needs for CeC PoP Experiment

December 11, 2015

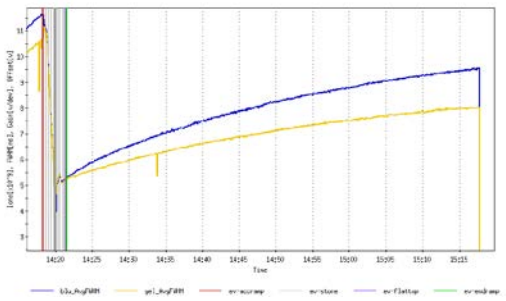
Effect of CeC Project Magnets on RHIC Beam

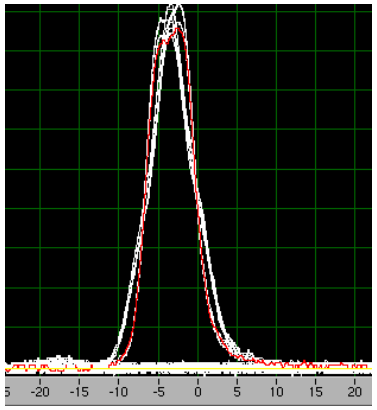
- Performed at injection energy
- Hadron beams in both rings
- Measure orbit distortion in both rings with energizing of the dipoles to full current
- Measure tune shift and orbit distortion with quadrupoles in the same polarity and maximal current
- Measure tune shift and orbit distortion with quadrupoles at nominal CeC settings
- One session – two hours

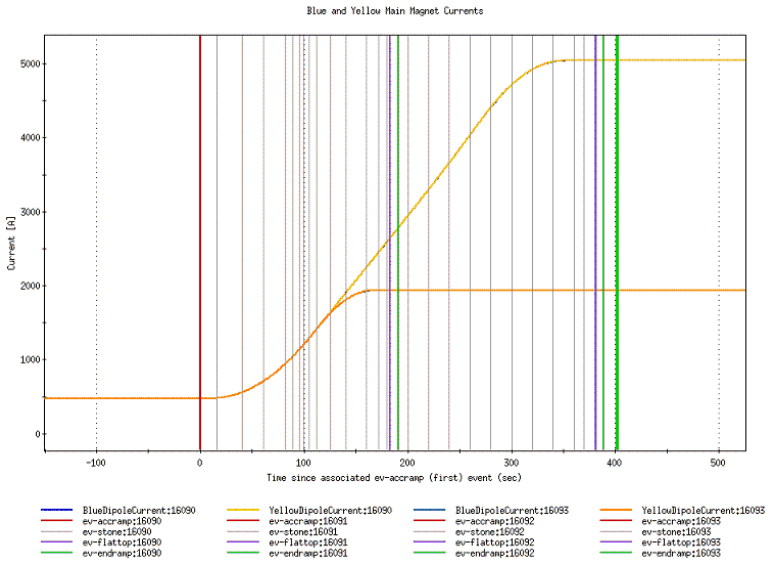


Ramp Development for CeC PoP Setup

- Gold ions in the yellow ring
- No beam in blue ring
- 6 (12) bunches
- Preliminary estimates are 40 GeV/u. Final energy will be determined after commissioning of 704 MHz accelerator cavity
- Measure orbit in the common section using low frequency BPMs
- Measure beam stability and phase shift between pick-up electrodes
- Measure longitudinal beam profile
- Two sessions – four hours each

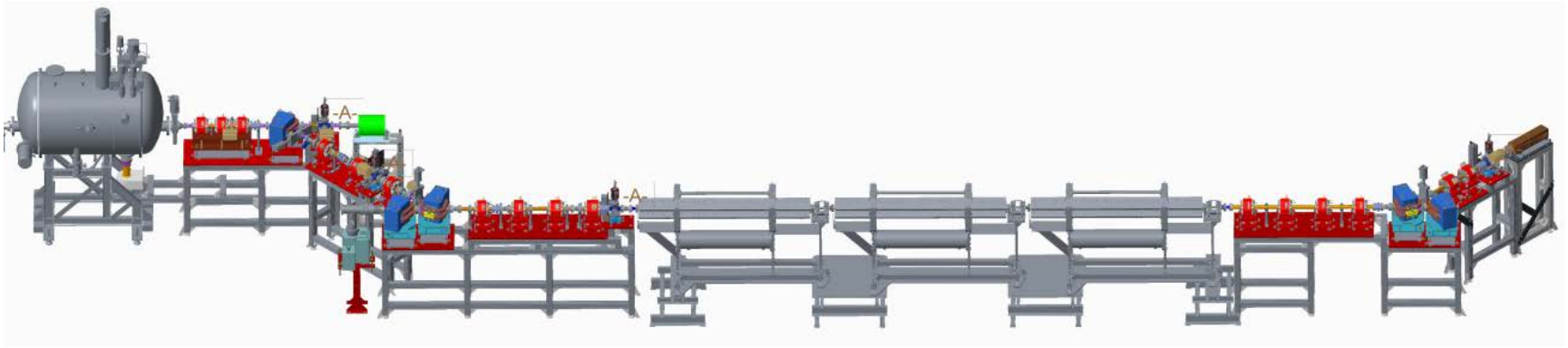






Propagate Electron Beam to High Power Dump

- No beam in both rings
- Deliver low power beam to all way to the high power dump
- It serves as part of polarity check for the dipole magnets
- Beam profile will be observed on the profile monitor in the common section
- Start tests of the high frequency BPMs, ICT near the high power dump, Faraday cup signal, profile monitor in front of high power beam dump
- Establish nominal currents for the last two quadrupoles and window for operation
- Two sessions – four hours each



Reach Full Power Electron Beam

- No beam in both rings
- Increase gradually duty factor of laser power and hence average beam current
- Commission BPMs, MPS
- Measure offsets between high and low frequency BPMs
- Measure phase shift between pick-up electrodes (coarse energy match)
- Two sessions – six hours each

Fault Studies

- Fault studies will be performed after receiving approval for start of commissioning
- No beam in both rings
- Electron beam will lost in the controlled manner (with MPS re-configured to allow higher losses)
  - at pepper-pot
  - at low power dump
  - on the dogleg valve
  - on the profile monitor in the common section
  - on the valve separating high power beam dump
- One session, four hours

Commissioning of IR Diagnostics

- No beam in both rings
- Measure FEL radiation spectrum and transverse profile
- Measure FEL gain
- Adjust phase shifters
- One session – four hours

Align Hadron and Electron Bunches

- Run at CeC PoP energy
- Gold ions in the yellow ring at CeC PoP energy
- No beam in the blue ring
- Observe signals from the pick-up electrodes on an oscilloscope and adjust cogging that electron bunch (low power beam) will be on the top of the hadron bunch
- Observe growth of FEL power with matching of the hadrons' and electrons' relativistic factors (high power beam)
- Two sessions – four hours each