

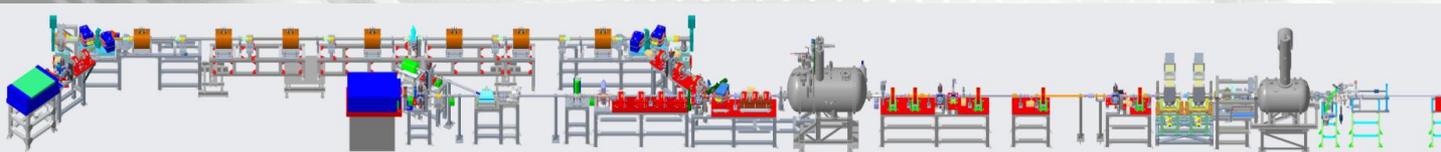
Coherent electron Cooling experiment at RHIC

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BROOKHAVEN
NATIONAL LABORATORY

U.S. DEPARTMENT OF
ENERGY

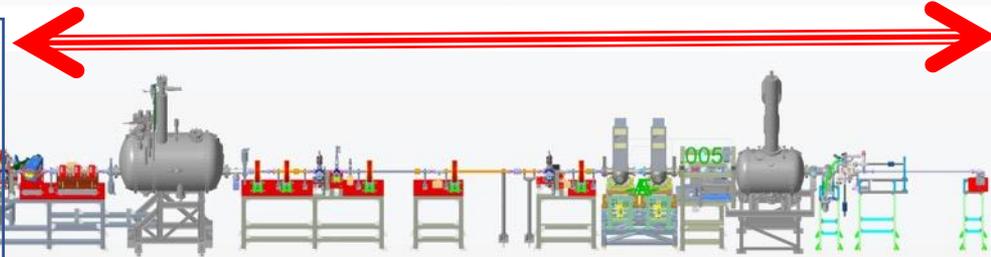
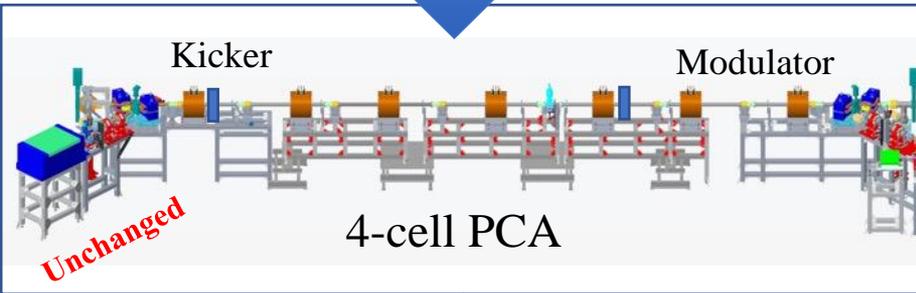


CeC PCA Beamline

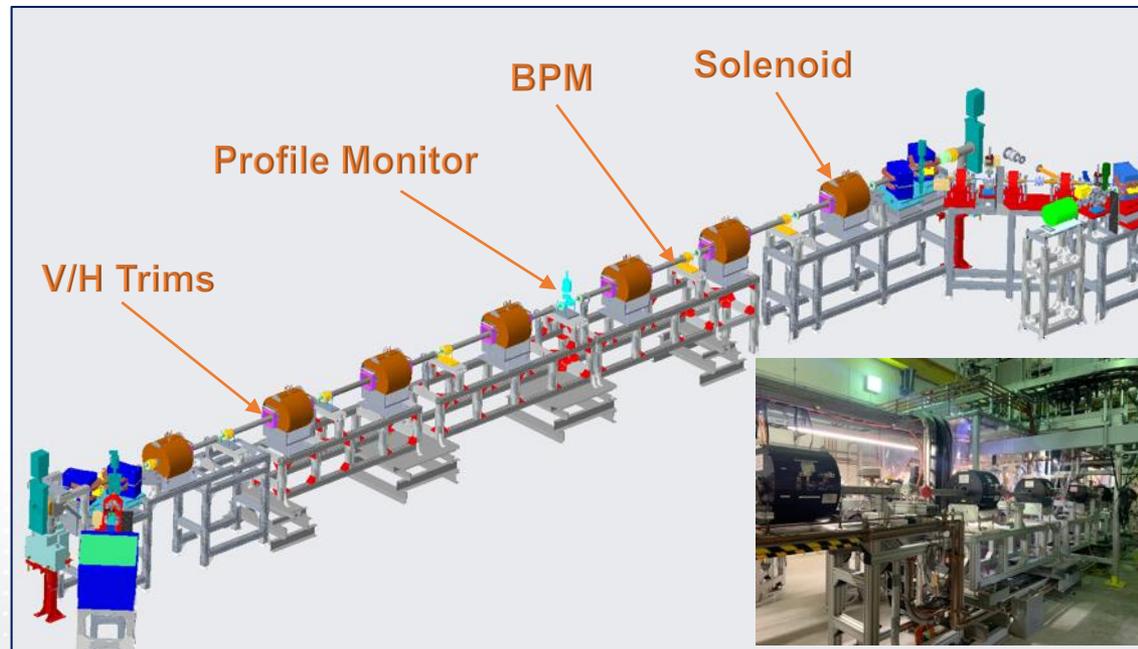


* Work in progress
* Completed

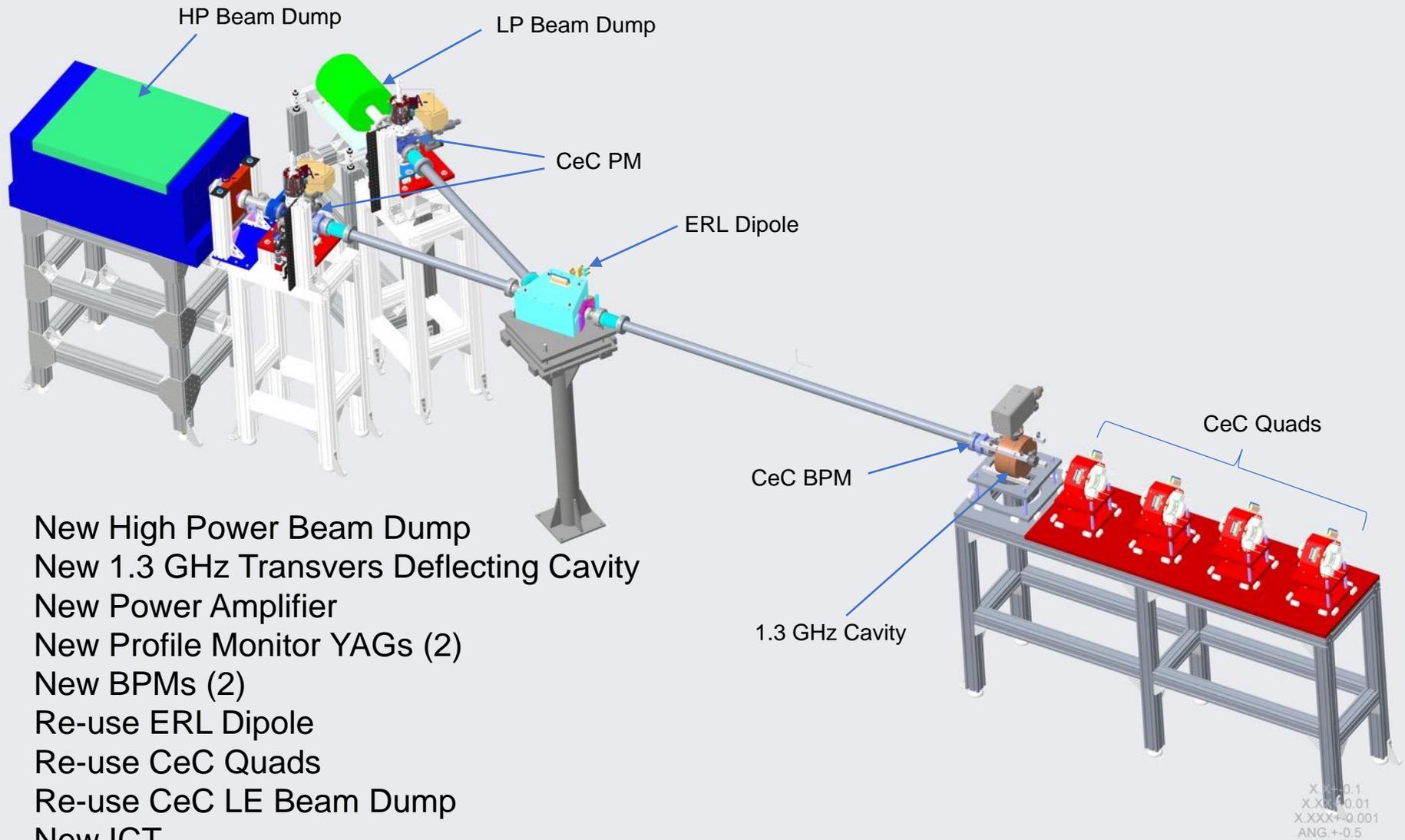
Unchanged



- 1) New water-cooled solenoids
- 2) Dipoles gap modification
- 3) New Stands
- 4) New Profile Monitor
- 5) New BPM housing and buttons
- 6) 12 Kicker-Modulator V/H Trims
- 7) New Y vacuum chamber for dipoles
- 8) New NEG coated beamline vacuum chambers
- 9) New stand supports for magnets
- 10) New RF shielded bellows
- 11) New conical transitions to RHIC
- 12) New beam line supports
- 13) Water Manifold for Solenoids
- 14) New replacement V/H trims for LEPT
- 15) Lead Shielding blocks
- 16) ATF Quads



2020 Diagnostics Beamline



- New High Power Beam Dump
- New 1.3 GHz Transvers Deflecting Cavity
- New Power Amplifier
- New Profile Monitor YAGs (2)
- New BPMs (2)
- Re-use ERL Dipole
- Re-use CeC Quads
- Re-use CeC LE Beam Dump
- New ICT

X: ±0.1
X.X: ±0.01
X.XXX: ±0.001
ANG: ±0.5

Goals for Run 20

- Establish e-beam Key Performance Parameters (KPP)
 - Milestone July 16, 2020
- Investigate Plasma Cascade Amplifier (PCA)
 - Milestone – August 31, 2020
- Investigate Ion Imprint in the electron beam
 - Milestone – September 30, 2020

Because of the photocathode situation, we may interchange 2nd and 3rd milestones

Establish e-beam KPP

Nearly complete

Parameter		
Lorentz factor	28.5	✓
Repetition frequency, kHz	78.2	✓
Electron beam full energy, MeV	14.56	✓
Total charge per bunch, nC	1.5	✓
Average beam current, μA	117	
Ratio of the noise power in the electron beam to the Poisson noise limit	<100	✓ <i>Need to verify</i>
RMS momentum spread $\sigma_p = \sigma_p/p$, rms	$\leq 1.5 \times 10^{-3}$	✓
Normalized rms slice emittance, $\mu\text{m rad}$	≤ 5	✓

Use of Dedicated time

Total allocation for this Run is 8 days

- This week 2 x 12 hrs (1 day)
 - Complete KPP studies
 - Develop RHIC ramp to 26.5 GeV/u
- Rest of July (2 days)
 - Establish beam dynamics in the PCA
 - Establish BBA and orbit control in the common section
 - Start investigation of PCA
- August (3 days)
 - Complete investigation of PCA
 - Establish overlap of electron and Ion beams
 - Start investigation of Ion imprint
- September (2 days)
 - Complete investigation of Ion imprint

Additional factors

- We may need to complete Fault studies of e-beam co-propagating with the ion beam in Yellow ring (new parallel mode of operation)
- With current mode, we will request operations with abort gaps aligned at 2 o'clock (10% portion of time charged to the dedicated CeC mode)