Coherent electron Cooling experiment at RHIC

Vladimir N Litvinenko

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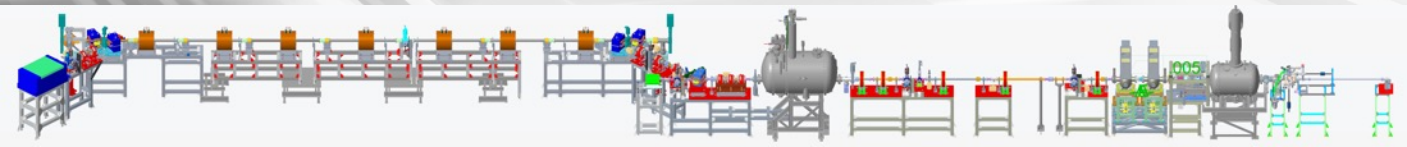
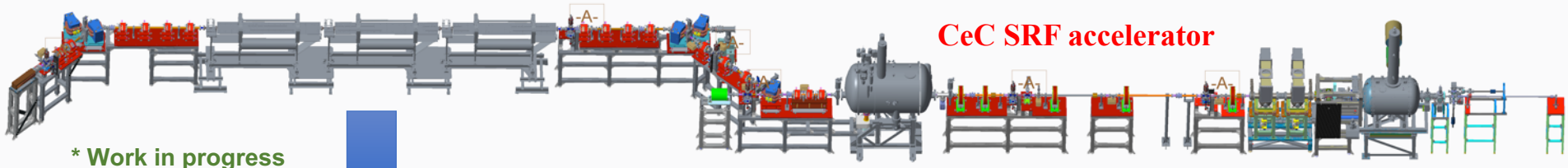
BROOKHAVEN NATIONAL LABORATORY

U.S. DEPARTMENT OF ENERGY

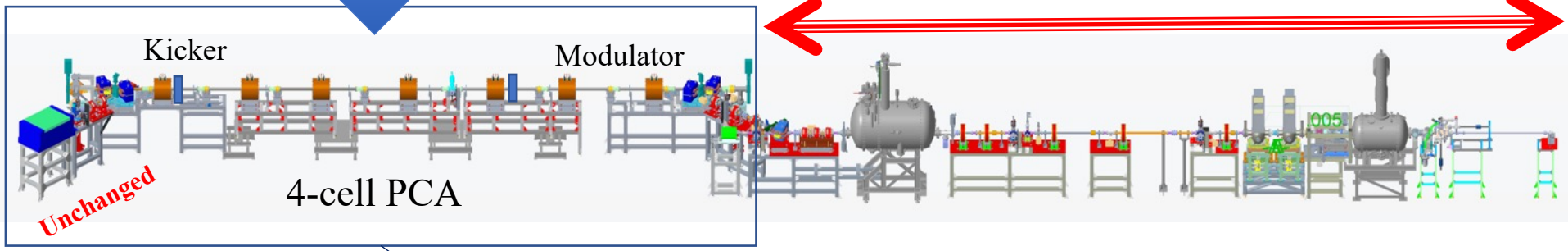


CeC PCA Beamline

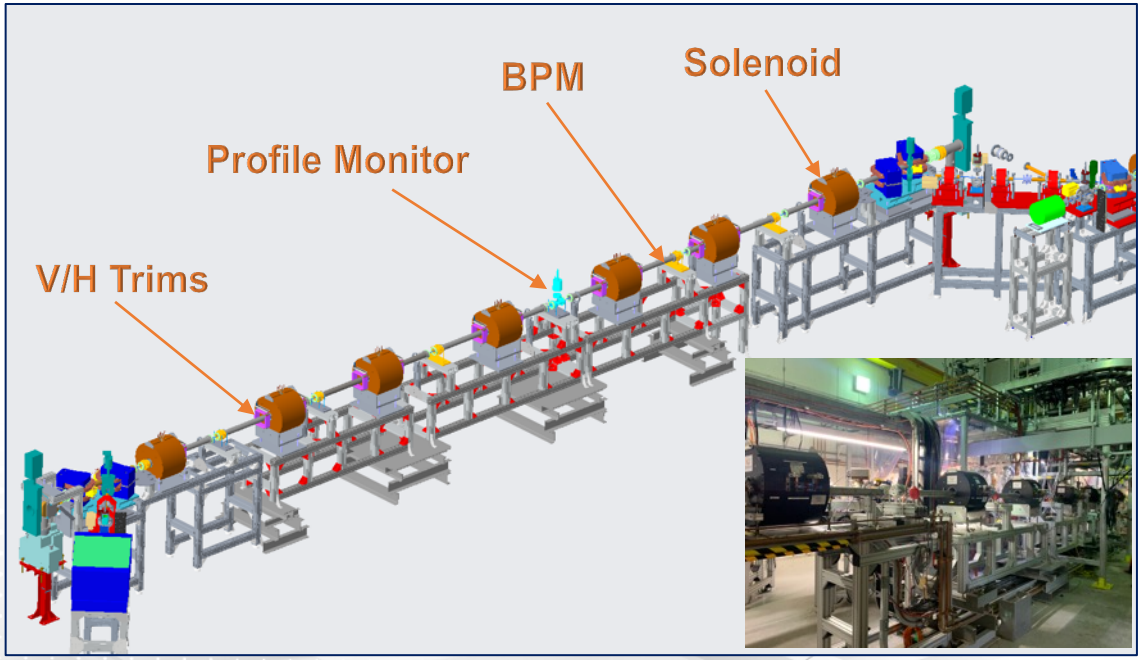


* Work in progress
* Completed

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 LEBT
15) Lead Shielding blocks
16) ATF Quads



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CeC Recent Accomplishments

- CeC accelerator is operational and beam was propagated (once!) to the high power beam dump….
- Completed:
  - The CeC accelerator components are re-commissioned and tuned to design parameters
  - Beam emittances are measured and compared with simulations
  - Laser feed-back is installed and is ready for commissioning
  - Magnetic measurements of all key components are completed
  - Delayed parts of the CeC system are installed :
    - 2 quads
    - solenoid power supplies
    - pepper-pot
    - the end of-the-line diagnostics unit

Recent set-backs

- Diagnostics unit at the end of the beamline has problem (5-degree offset) and can not be used.
  - Need to be fixed – required clean room installation and venting of the beamline after SRF linac
  - Requires two accessed and may result in one to two weeks delay in CeC operation after the fix
- We are not allowed to change dipole current when RHIC is operational
  - CeC dipoles introduce significant tune shift for the low energy RHIC beam and dipoles have to be at a fixed current. It does not allow to tune CeC accelerator by changing current in the first dipole.
  - We have a spare power supply to feed the first dipole separately but did not have cables to connect it. Cable should arrive prior to next maintenance day. We may need to extend duration of the maintenance at IP2.

Plan for Run 18

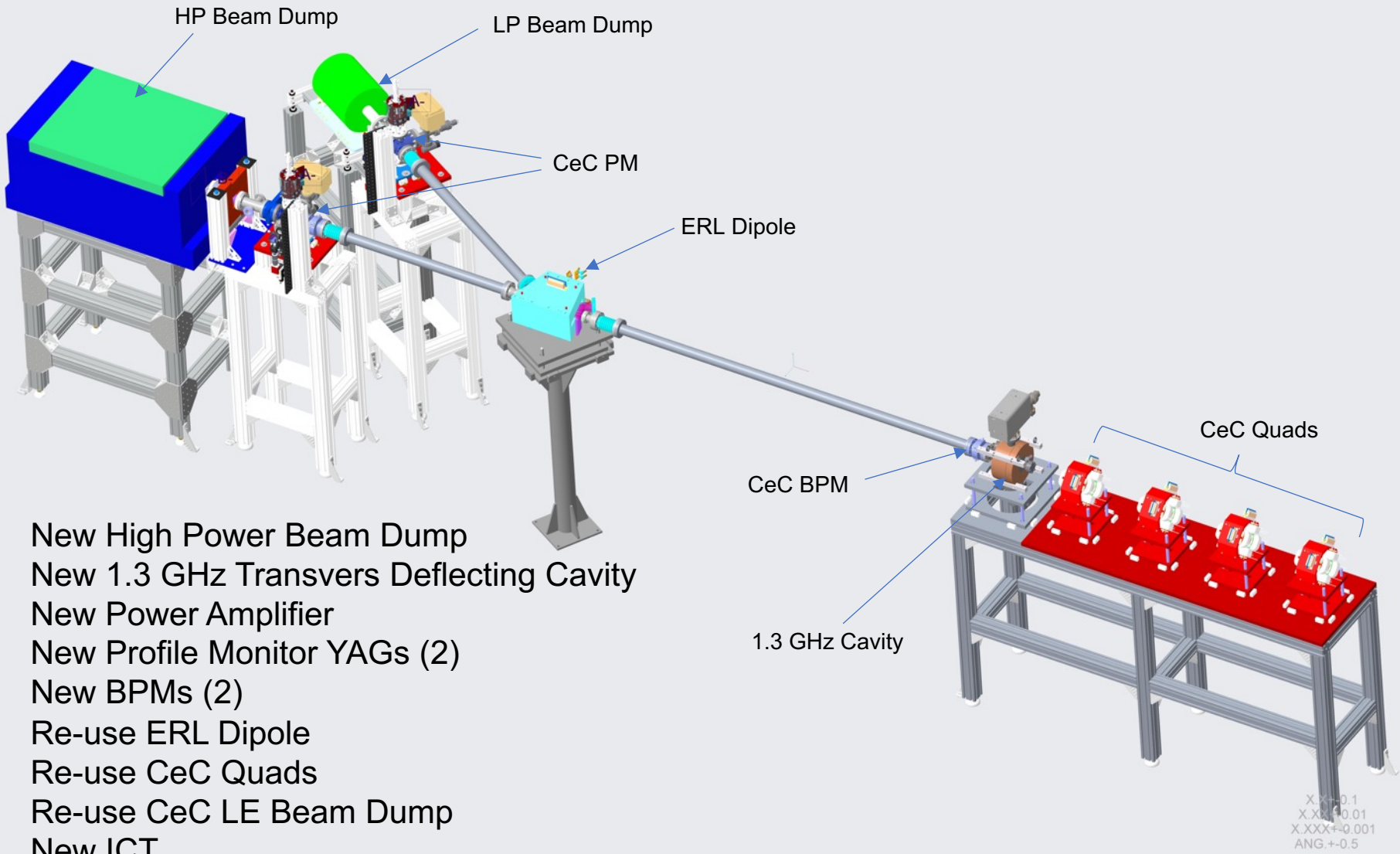
- Verify quality of the electron beam (including noise)
- Propagate 100% of electron beam to the high power dump in both relaxed and PCA mode
- Demonstrate PCA (plasma cascade amplifier)
- Observe ion imprint

Plans and possible scenarios

- Test parallel mode with RHIC stores
  - Abort gaps at IP2 and LEReC is operational
  - Dipoles are at 93.9 A (nominal for γ=28.5)
- Verify that radiation level at LEReC are acceptable
- When necessary – request dedicated beam time
  - 8 hrs this
  - Expect to have ~ 16 hrs more in March
  - 2 days in April
  - 2-3 days in May
  - 2-3 days in June

Back up Slide

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