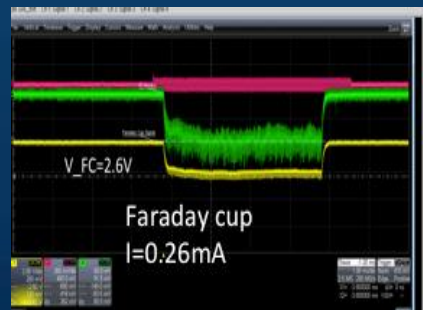


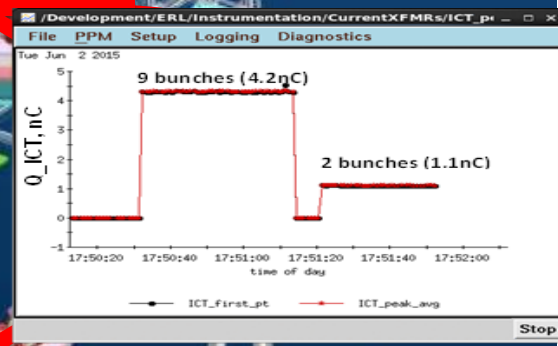
BNL R&D ERL Lesson learned

- ✓ Compact SRF ERL construction completed: May 2015
- ✓ SRF gun with photocathode demonstrated $Q=0.55nC$, $I=.26mA$ per 4 msec: June, 2015
- ✓ Beam instrumentation has been tested during July-Oct 2015 run.
- ✓ During beam commissioning we found out that some components needs to be modified for better performance.
- ✓ Many ERL components have been reinstalled in new location to be used for RHIC upgrade project: LEReC
- ✓ Beam test of LEReC injector starts : Apr 2017.



SRF 5cell linac

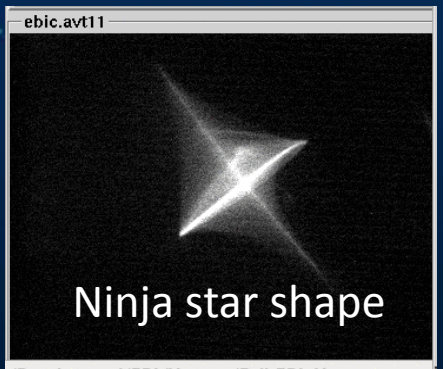
Faraday cup
I=0.26mA



Beam dump

Returning loop

~20m circumference



*more about LEReC on Wednesday afternoon

Summary MOIDCC006

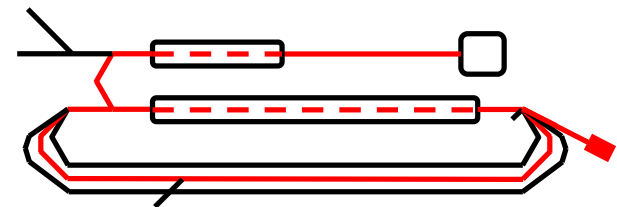
ERL Mode of S-DALINAC: Design and Status



- Modification from twice to thrice recirculating layout including ERL mode finished
- Main design points: New separation dipole, beam dynamics
- Installation including lasertracker based alignment, tests of path length systems

Under Commissioning

- Transmission of $\sim 35\%$ in once recirculating operation reached
- Next step: Once recirculating ERL



Summary and Outlook at present ERL17

- The Compact ERL was commissioned and is in stable operation.
- Learned many lessons from the commissioning.
- The photocathode DC gun and both (injector and ML) SC cavities are operating very stably.
- Achieved beam current of **1 mA**
- Achieved low beam emittance (~ 1 mm·mrad) **at medium bunch charges (< 7.7 pC/bunch).**
- X-ray production from Laser Compton Scattering was successfully demonstrated.

Subjects in the near future

- Lower emittance at high bunch-charges ($q_b \geq 7.7$ pC) **Achieved**
- Beam current: 1 mA (\rightarrow 10 mA) **Achieve 1mA operation and also demonstrate the possibility of 10mA operation**
- Bunch compression ($S_t \sim 100$ fs) and THz production ($S_t \sim 250$ fs)

We have established many important technologies for the ERL light source. We continue to conduct R&D effort on remaining issues such as:

- Improved cavity-assembly technique for higher accelerating gradient
- Mass-production technique for main-linac cavities

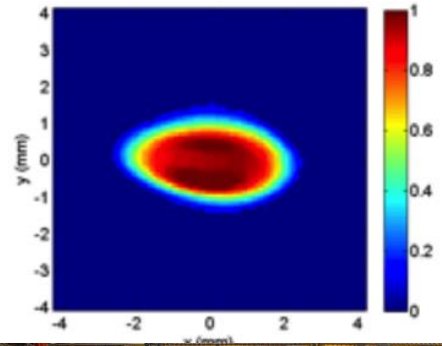


Status of CBET

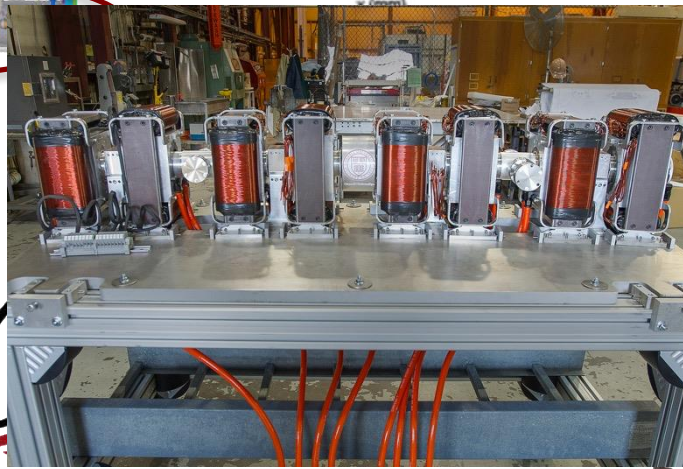
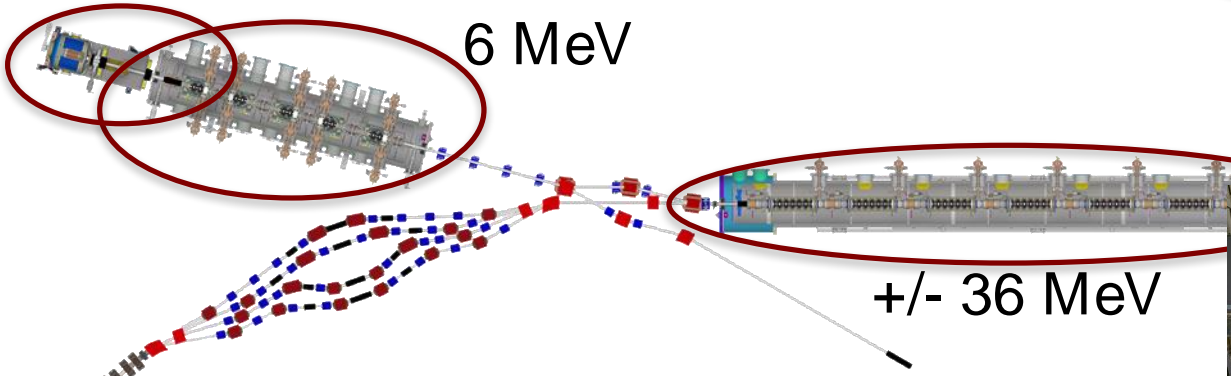


- Cornell DC gun
- 100mA, 6MeV SRF injector (ICM)
- 600kW beam dump
- 100mA, 6-cavity SRF CW Linac (MLC)

Fist beam through all linacs



Tested



CBET

CORNELL-BNL ERL TEST ACCELERATOR

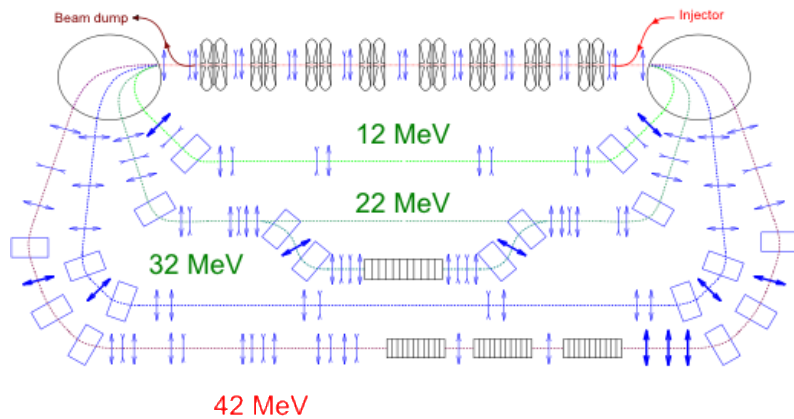
Beams of 100mA for 1 turn and 40mA for 4 turns

42, 78, 114, 150 MeV

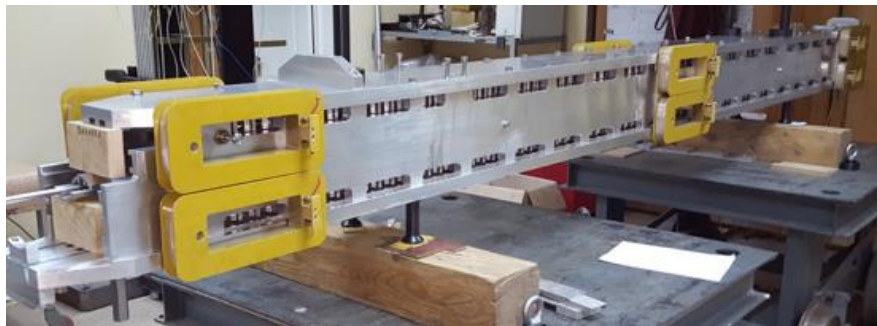
Novosibirsk ERL facility

G.N. Kulipanov and NovoFEL team, BINP

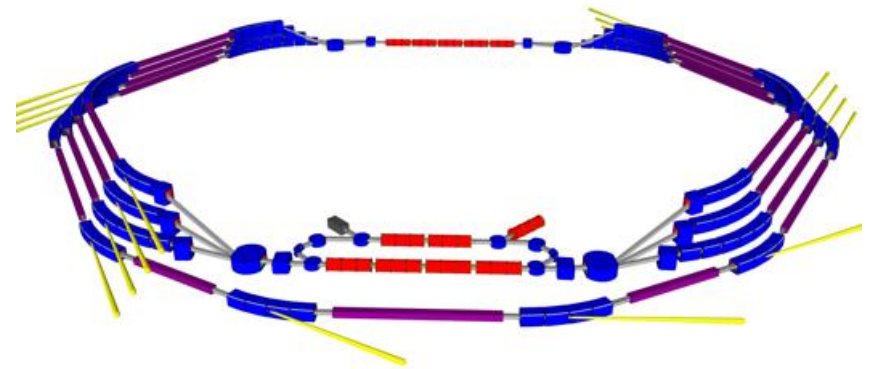
NovoFEL



High current NCRF gun



Variable period undulator



MARS – multi-turn acceleration recuperator – an ERL-based x-ray source