



# Potential ILC contributions from Cornell

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for

Cornell Laboratory for Accelerator Based Sciences and  
Education

Cornell has experience in using CESR to study wiggler-dominated ILC damping rings; has verified electron beam simulations against experiments from source to high energy; and has developed and operated SRF components.

Design – SRF – Damping rings – Positron  
polarization





# Potential contributions from Cornell

## 1) Accelerator design

- a) Electron source optimization
- b) Electron beam-transport optimization, including space charge, CSR, micro-bunching, polarization.
- c) Damping-ring design / simulation / optimization

## 2) SRF topics

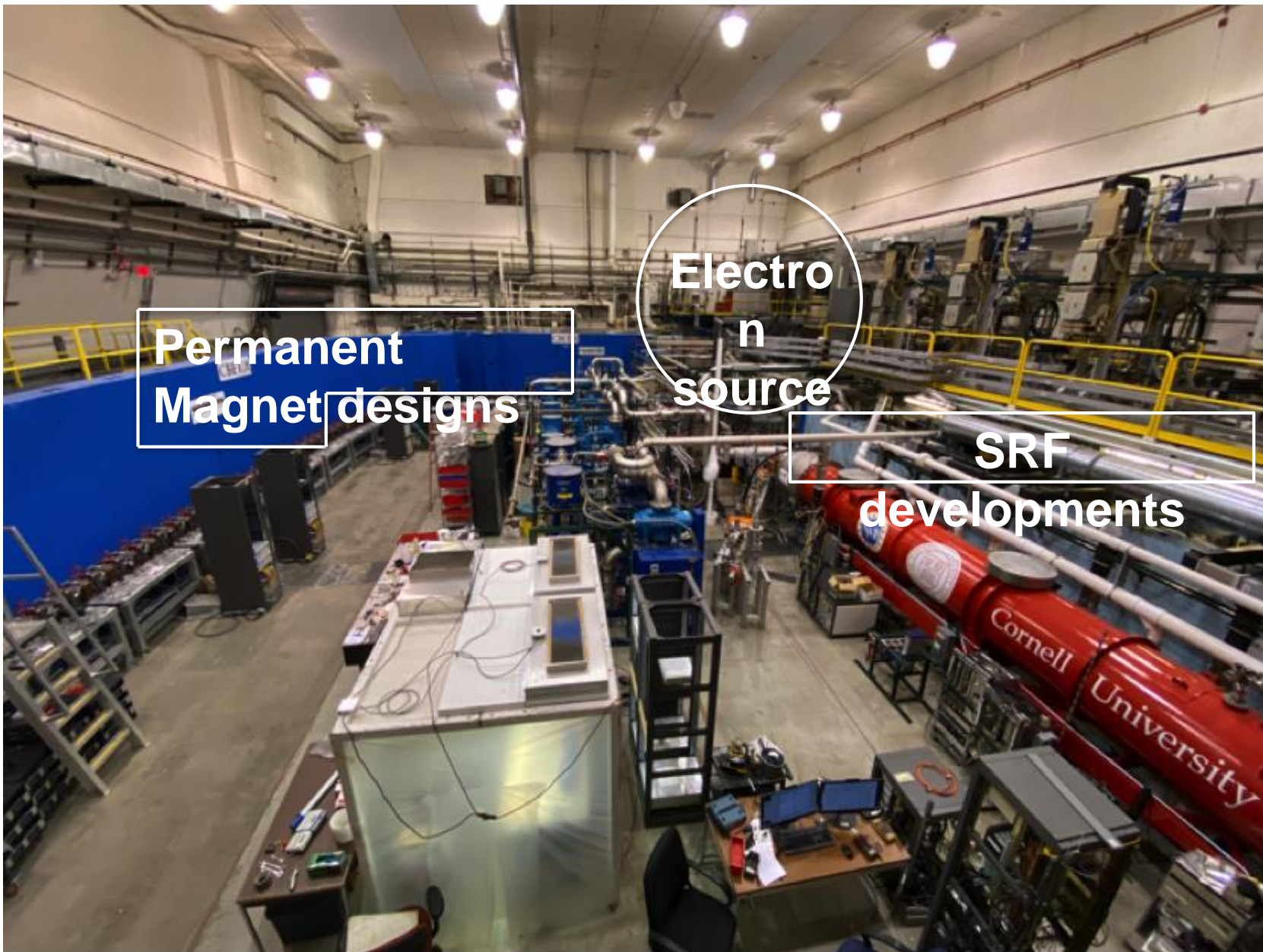
- a) SRF material qualification
- b) Vertical bare cryogenic **cavity tests**
- c) Horizontal dressed cavity testing in Cornell's HTC
- d) SRF **component testing**, e.g. cold tuners, HOM absorbers, couplers
- e) HOM absorber material studies
- f) SRF simulations, cavity design, RF **component design**

## 3) Damping ring dynamics

- a) Permanent magnet optics (from CBETA experience)
- b) Superconducting wigglers (from CESR experience)

## 4) Positron production

- a) Helical undulators (from optical stochastic cooling experience at CESR)



Permanent  
Magnet designs

Electro  
n  
source

SRF  
developments





# Potential Cornell SRF Contributions

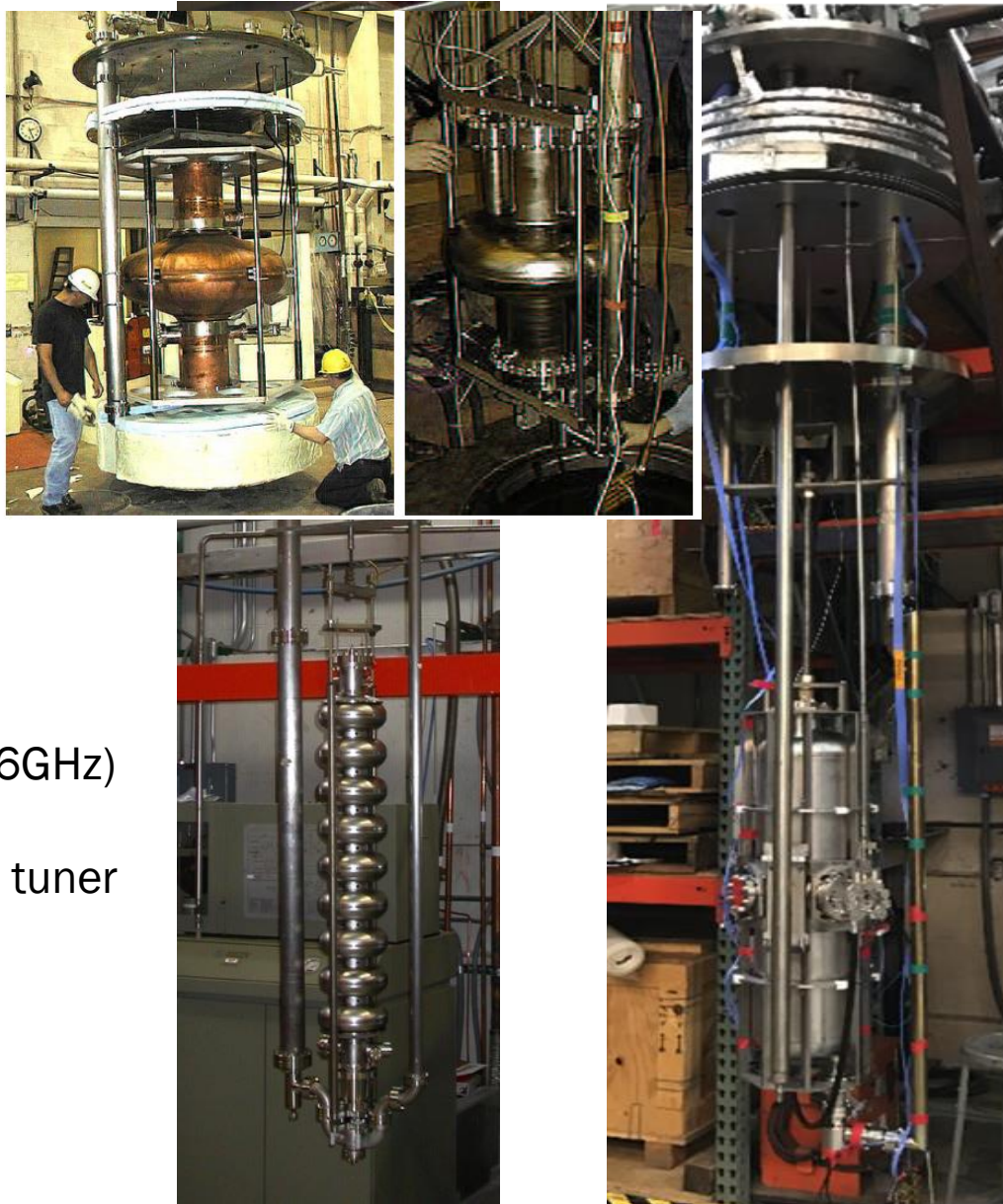
SRF simulations, cavity design  
CST Studio, ACE3P,...

Niobium material qualification  
E.g., trapped flux studies

SRF cavity fabrication  
Including in-house EB welding

Cavity preparation  
BCP, EP, CBP, furnace treatments,  
doping...

Vertical cryogenic cavity tests (200MHz–6GHz)  
Inside liquid helium bath  
**With LHe in cavity tank only** (e.g., for tuner  
testing)





# Potential Cornell SRF Contributions

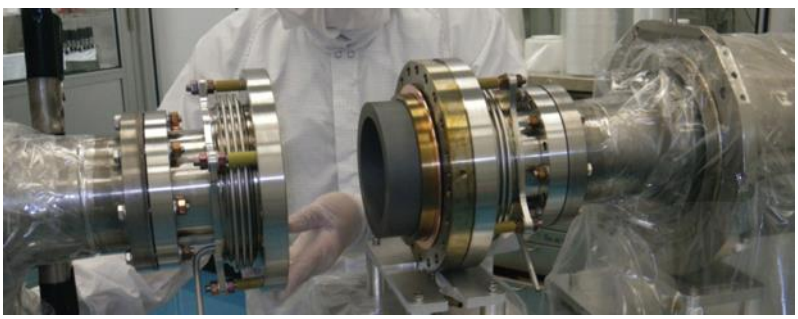
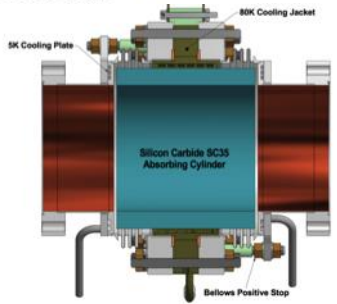
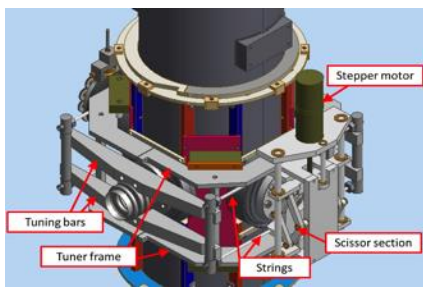
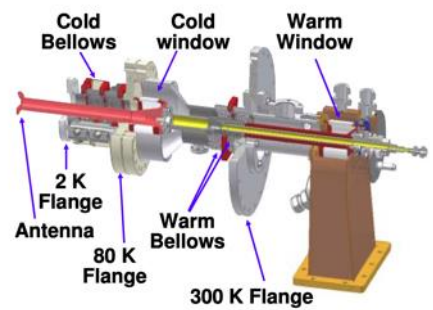
## SRF component design and testing

E.g. cavity tuner, HOM absorbers, RF coupler  
HOM absorber material studies

## Horizontal dressed cavity testing in Cornell's

### Horizontal-Test-Cryomodule (HTC)

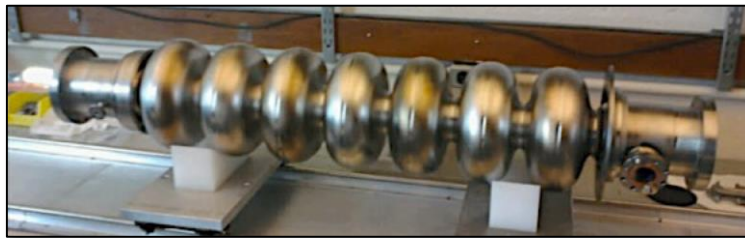
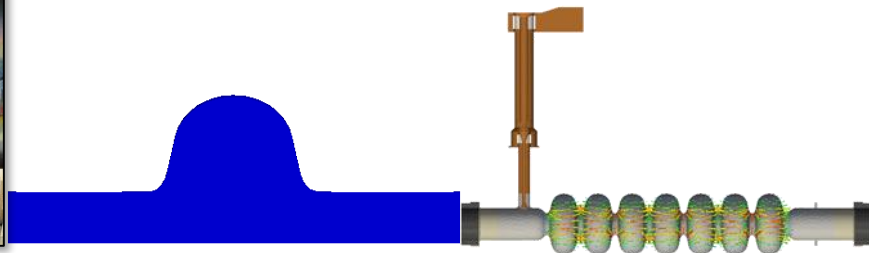
1-cavity cryomodule, e.g. used for first LCLS-II  
HE 9-cell cavity cryomodule test  
Horizontal test bed to study cavity  
performance, RF coupler performance, cavity  
operation, LLRF controls...







# Cornell SRF Group Capabilities



RF design

Material characterization

In-house cavity fabrication

Cavity surface preparation

SRF cavity vertical testing

Component R&D / testing

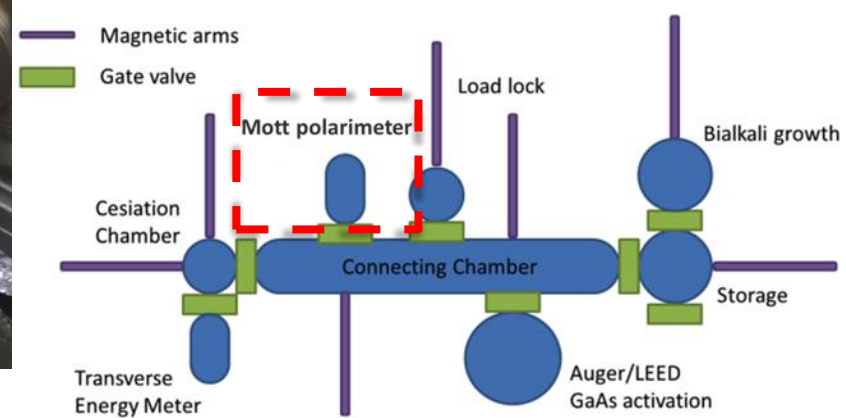
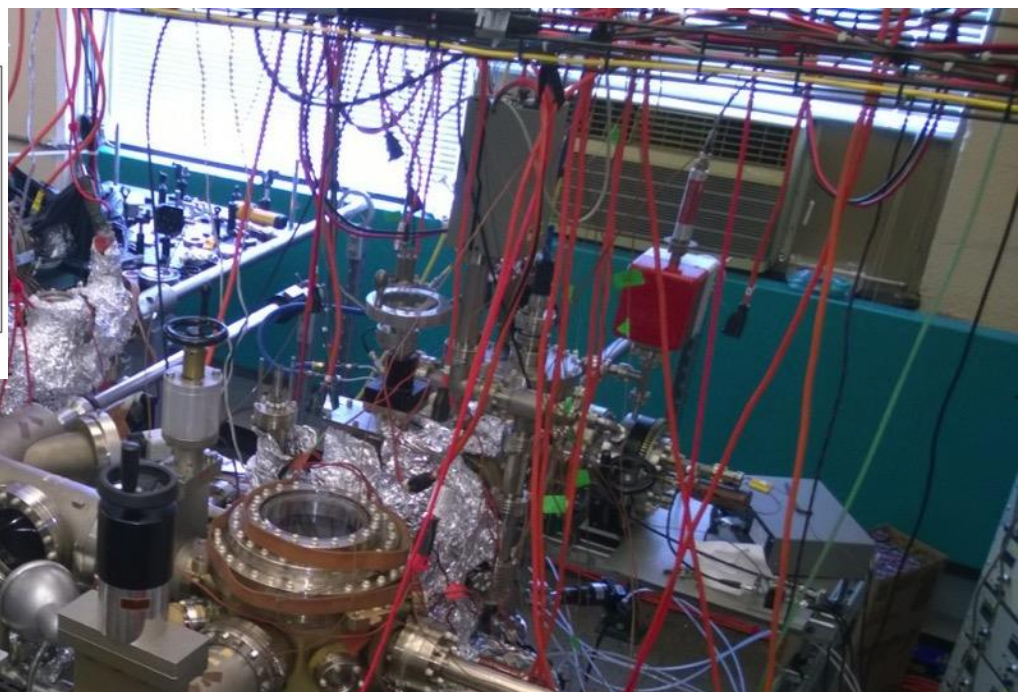
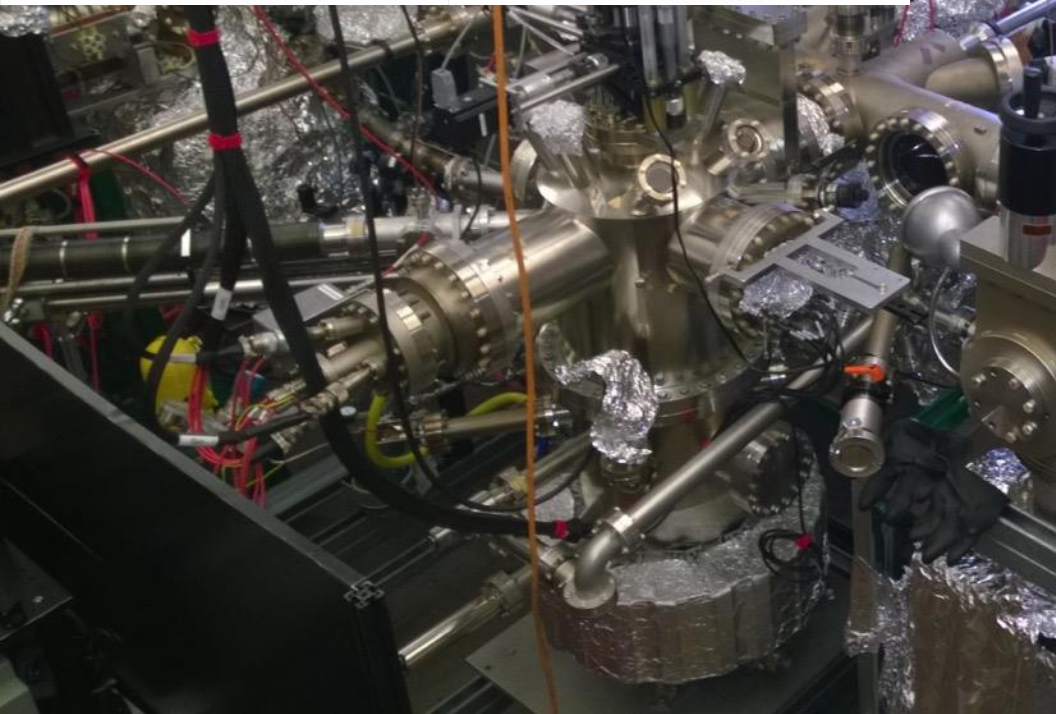
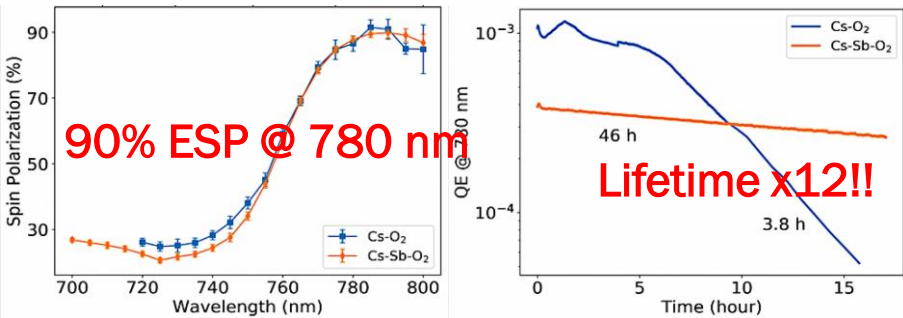
Cryomodule design, assembly, and testing

Design and fabrication to full cryomodule



# Cornell opportunity: Cathode production (incl. polarized)

## New activation methods that improve lifetime



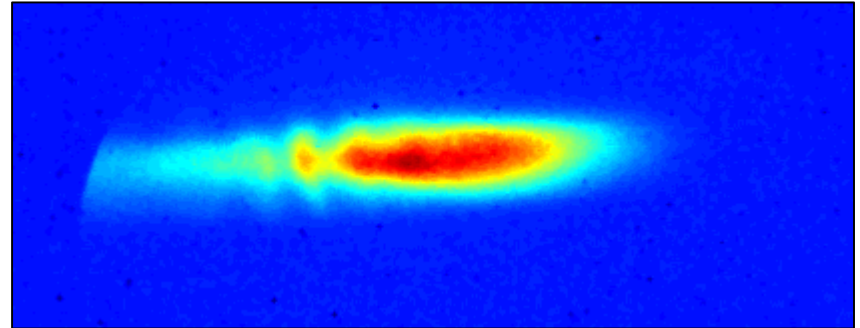
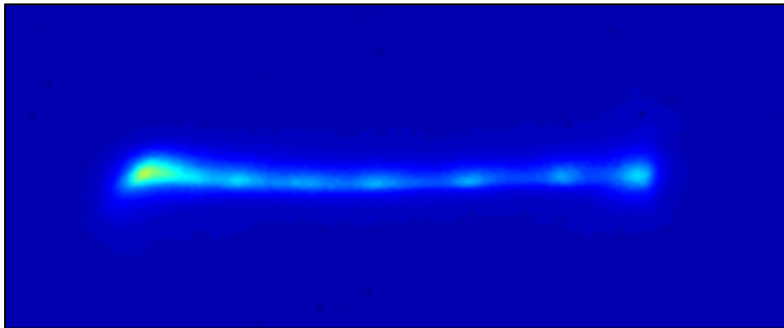




# Indications of micro-bunching / CSR

Occasionally, during operation a charge-dependent structure on the beam profile was seen

- As early as the beginning of the second pass
  - Charge dependent
  - Single bunch effect
  - Optics dependent
- ➔ Capability to investigate CSR, CSR shielding, and micro bunching.







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# Questions ?