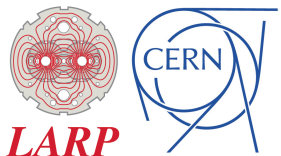




# Crab Cavities Failure Modes: Preliminary Analysis

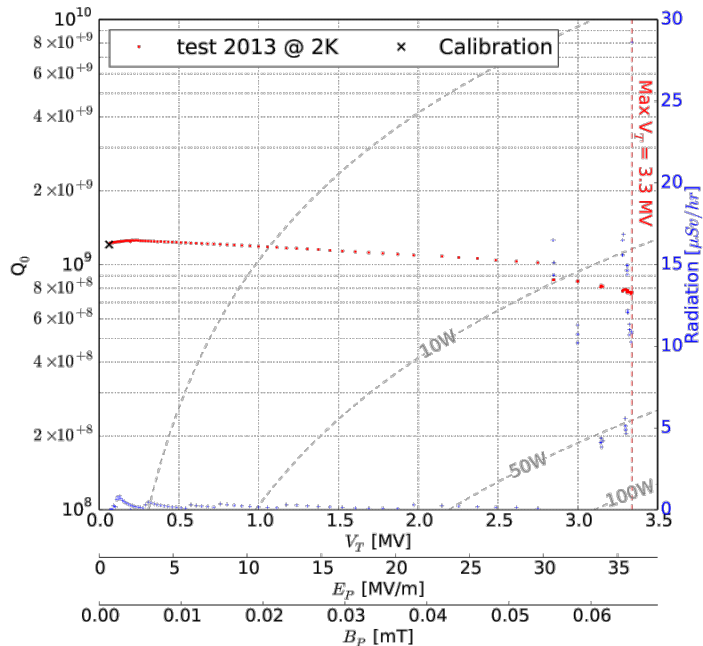
Alejandro Castilla on behalf of Antoine Benoit, Karim Hernandez Chahin, Alick Macpherson, Katarzyna Turaj.

Joint LARP CM26/Hi-Lumi Meeting SLAC 19/05/2016

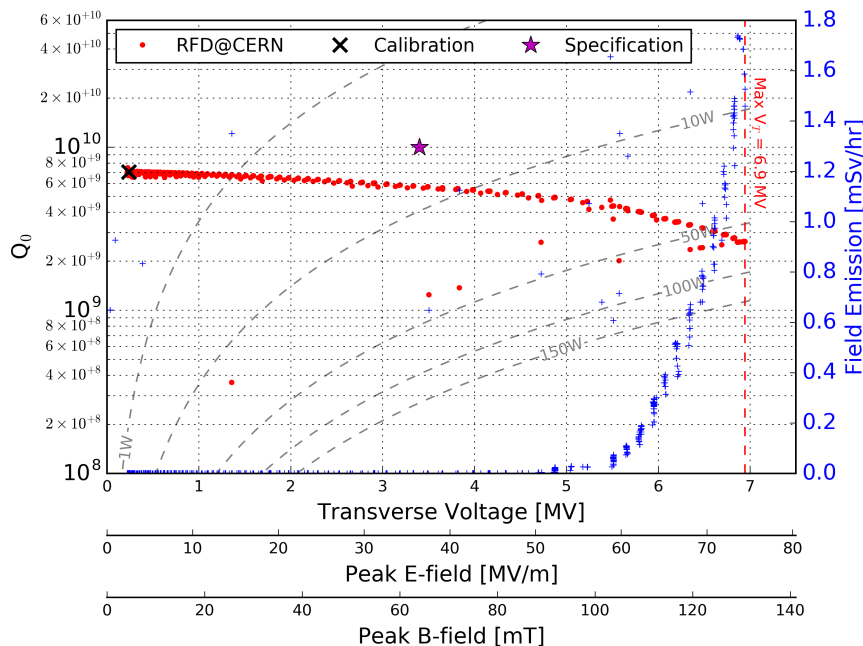


# Crab Cavities Performance, Vertical Test @2K

## UK4RD

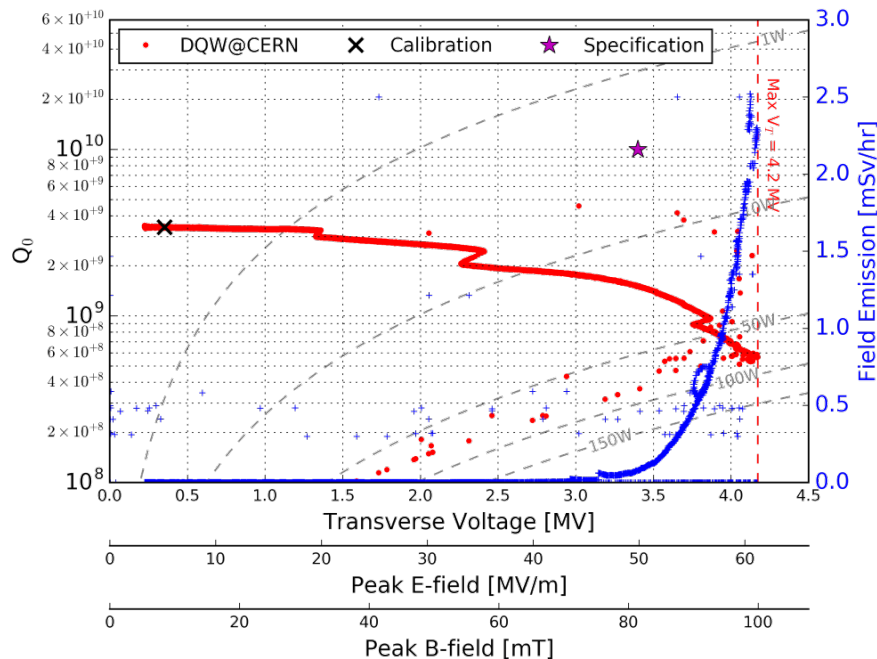


## RFD



# Crab Cavities Performance, Vertical Test @2K

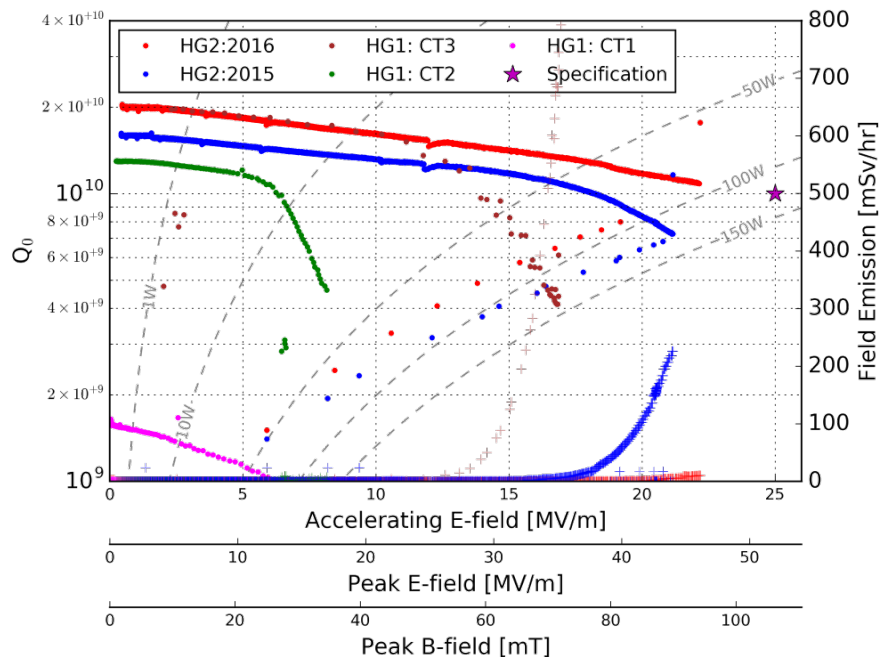
## DQW



- Limited data of quenches up to now.
- Analysis of the time scales: ring-down vs quenches.
- Quenches observed for the DQW showed a standard decay time ( $\sim 13$  ms up to  $\sim 102$  mT).

# High Gradient: Improving Our Methodes

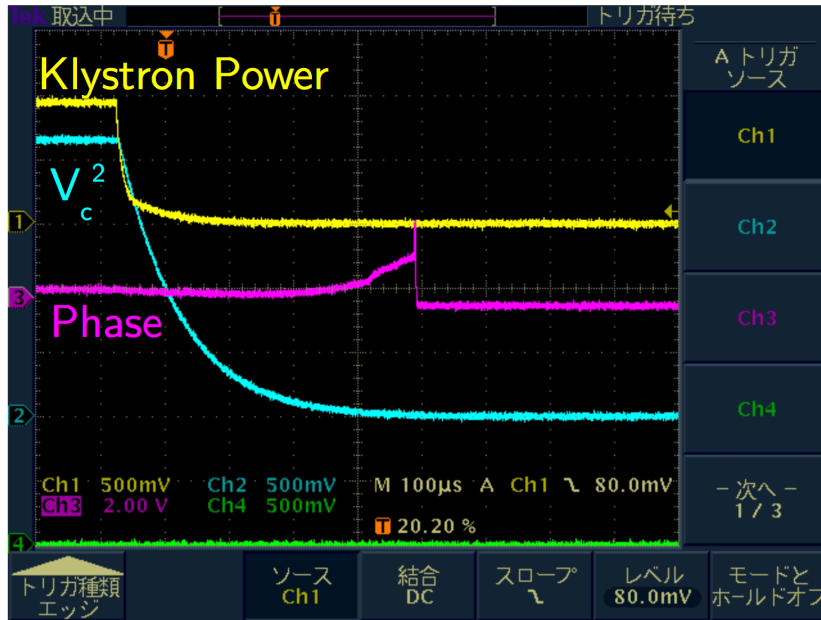
## “Learning” Curve



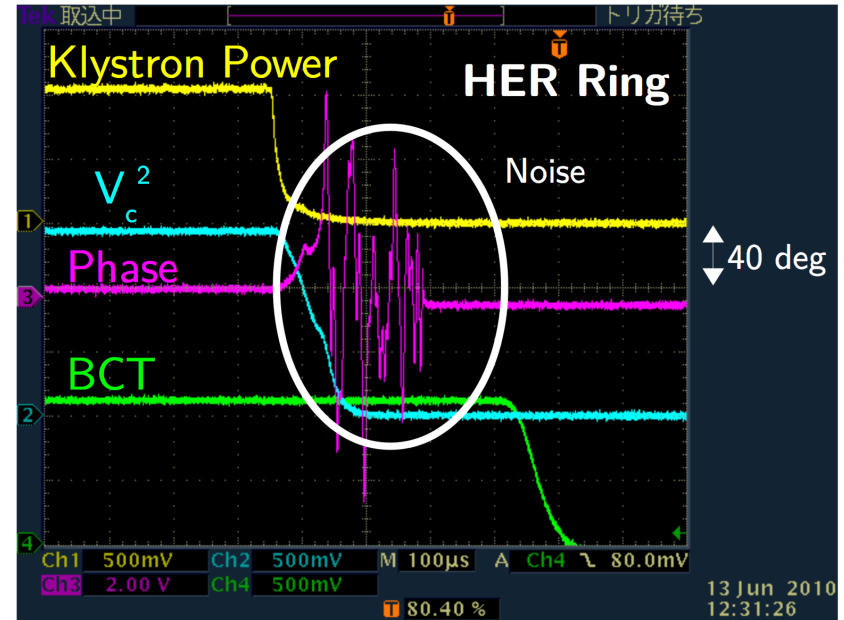
- Surface preparation and clean assembly protocols improved considerably:
  - Higher  $Q_0$ .
  - Higher gradient.
  - Lower field emission.



## W/O Beam

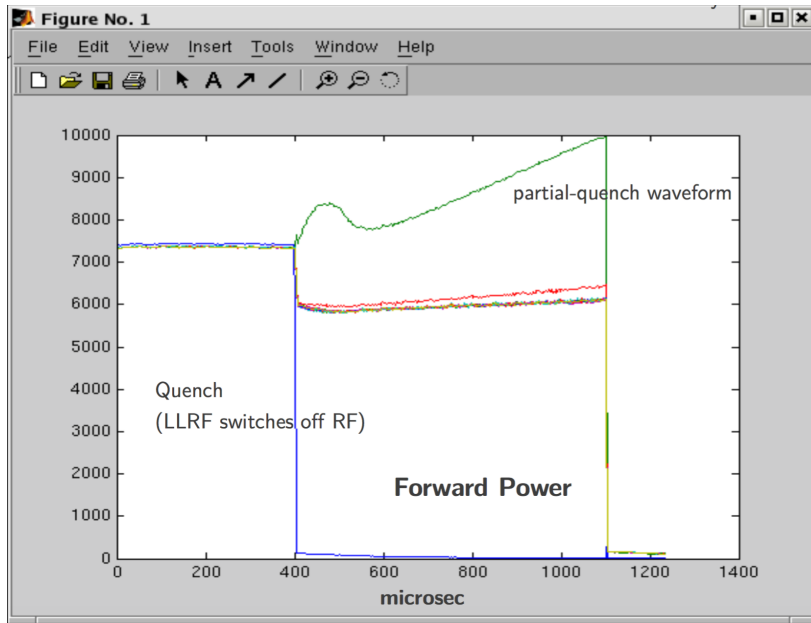


## With Beam

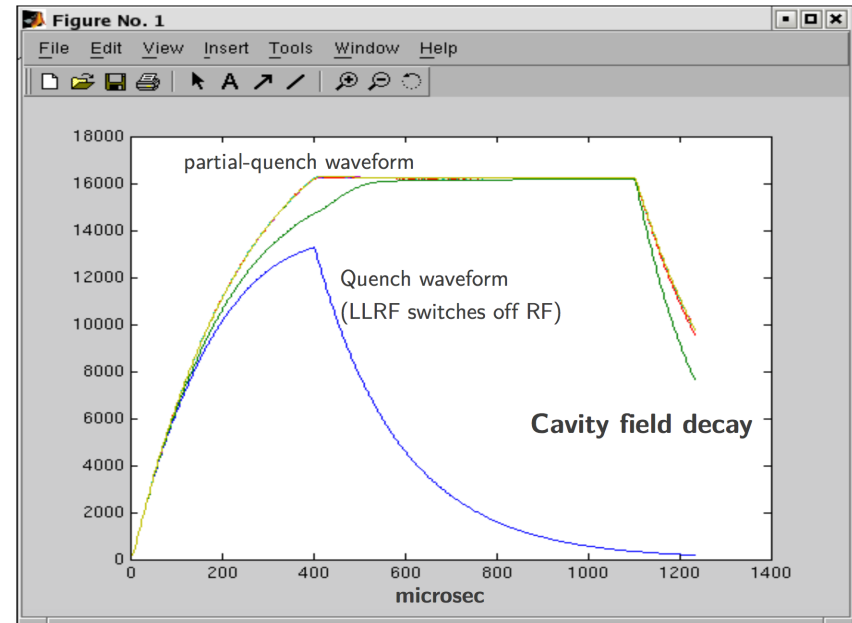


# SNS Lessons (S.H. Kim): Partial Quenches.

## Forward Power

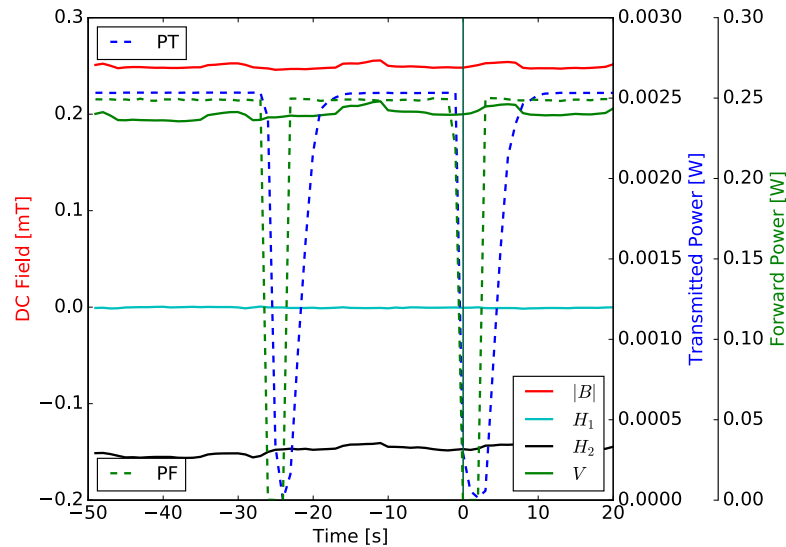


## Cavity Field

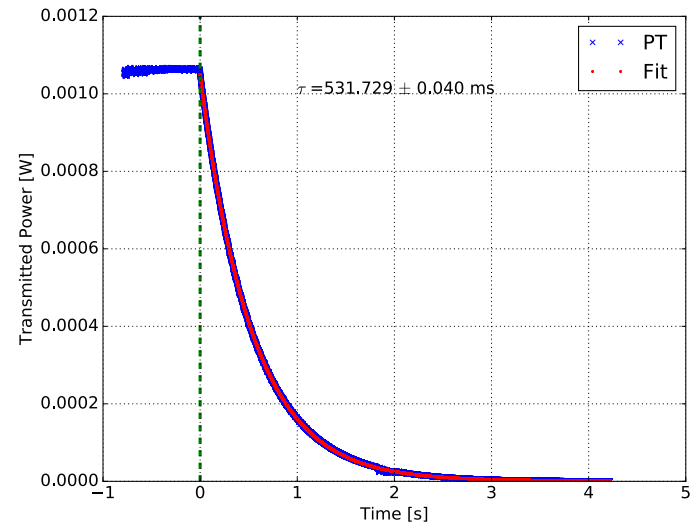


# Low Power Pulsed Mode: No Quench

## Environmental Data

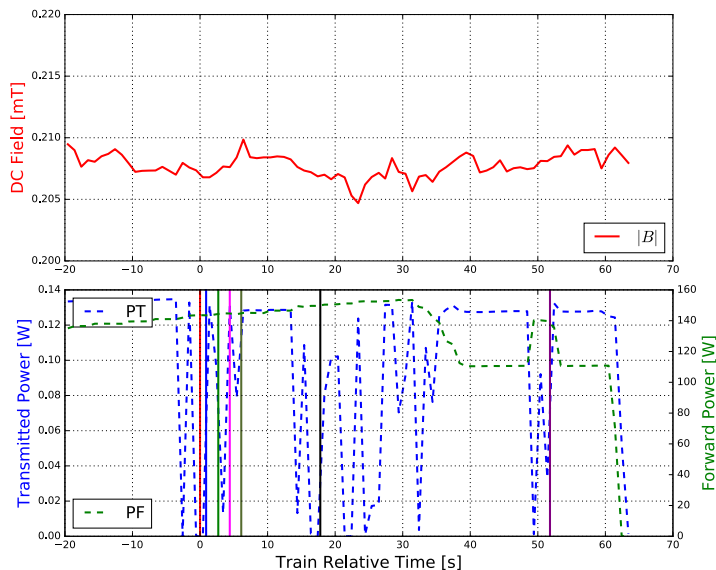


## Long Decay: Outside Pre-Trigger Range (>200 ms)

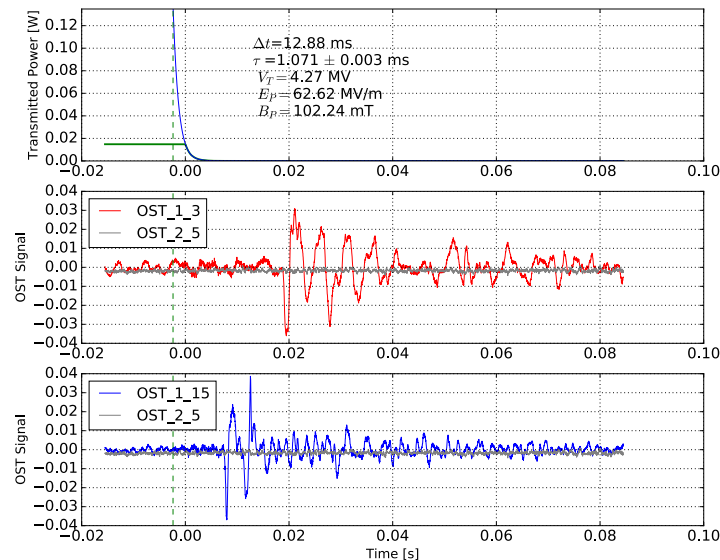


# [Relatively] High Voltage: Quench Train

Environmental Data  
with Quench Train Traces

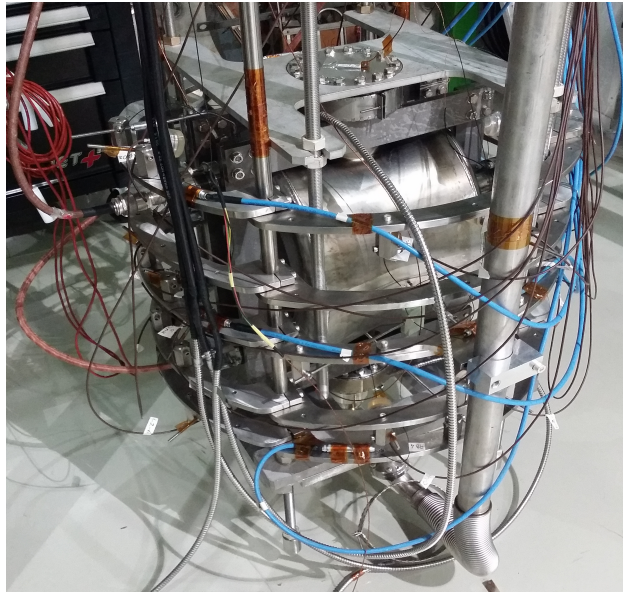


“Fast” Decay:  
Representative Quench (~13 ms)

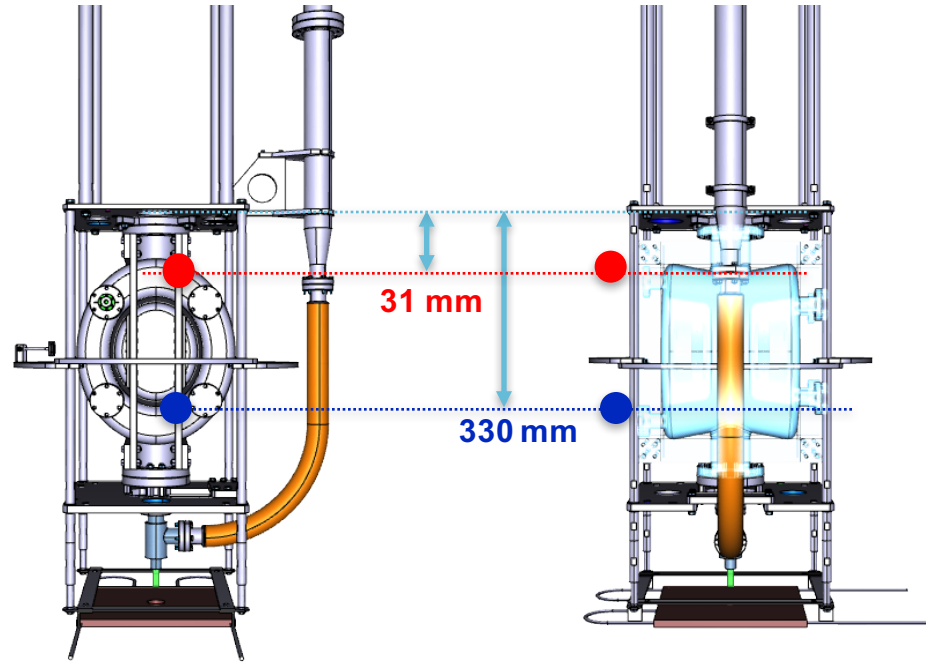
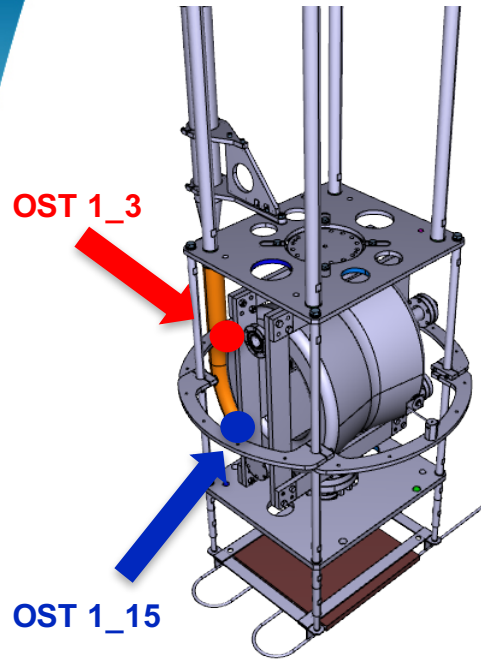


# Vertical Test: Instrumentation Setup

## DQW with Instrumentation



- Temperature Mapping.
- Magnetic Flux Gauges.
- OST's.

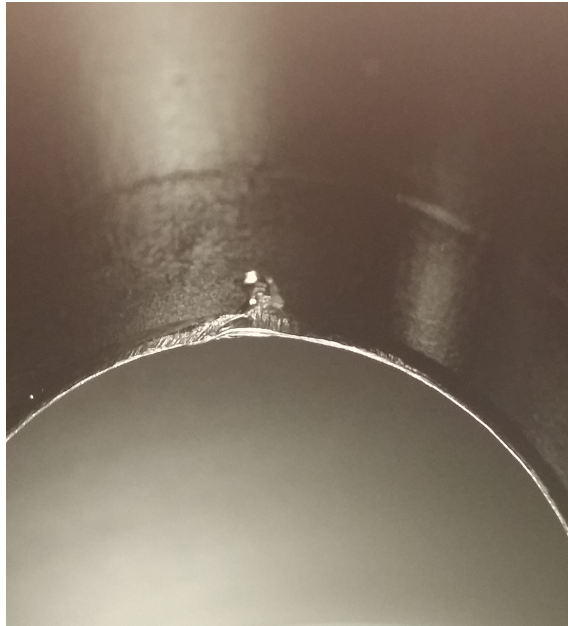


## Location of OST's 3 & 15

The location of the quench is near the high magnetic field region around the HOM ports for the PoP cavity. Proper localization using triangulation of the OST signals is under analysis.

# Feature at the FPC Port

## Close-up of Inner Surface



- A “chip-like” feature was found at the high magnetic field area.
- Potential candidate for quench spot.



***Thanks.***

Many thanks to the CERN BE-RF-SRF Technical Staff, the Lancaster University Team, and US-LARP Colleagues.

