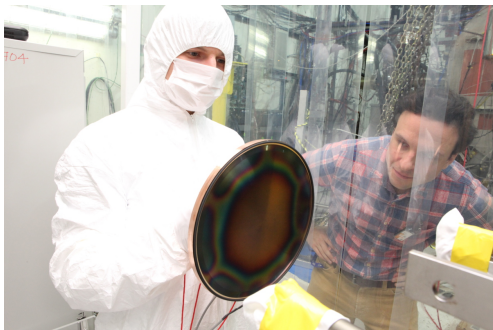


Modular Cavity Status

Daniel Bowring

October 23, 2015



Modular cavity program overview

Program Goals

- ▶ Validate conceptual model of breakdown in strong B -fields.
 - ▶ Do this with good control over systematics.
 - ▶ Provide guidance to cooling channel designers.
1. Determine maximum safe operating gradient for $B = 0$, Cu walls.
 2. Determine maximum safe operating gradient for $B = 3$ T, Cu walls.
 3. Repeat measurements with Be walls.
 4. Inspect the cavity regularly & thoroughly to understand the role of B -field in cavity damage.

Notable results from recent run

- ▶ In $B = 0$, we have achieved record gradients at 805 MHz in the MTA. (w/ possible exception of box cavity)
- ▶ After some early-October tweaks, the source was eerily stable.
- ▶ Inspection infrastructure – built & tested over several years – is working well and giving good data.
- ▶ No coupler-related breakdown damage observed. Cavity seems to be performing as designed.

Recap of the past several months

August 17 - September 9

September 10 - September 28

September 28 - October 10

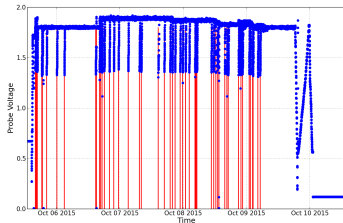
October 11 - today

“first stage” of run

klystron work, HPRF

“second stage” of run

inspection prep, inspection

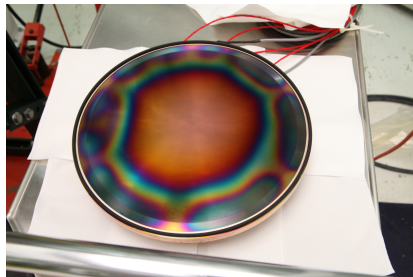
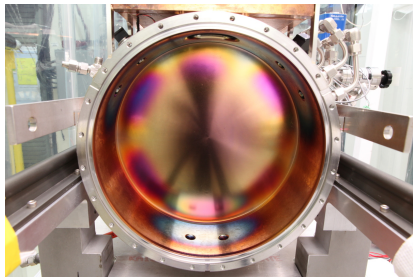


Visible in this plot: final determination of gradient corresponding to spark rate of 10^{-5} + end-run radiation studies.

Results of $B = 0$ run

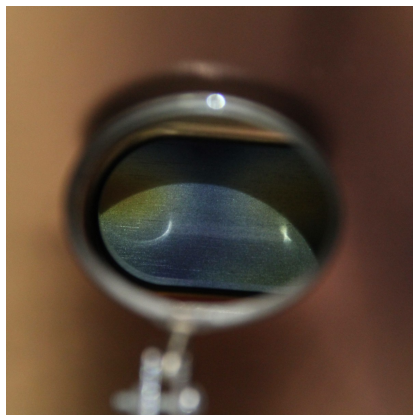
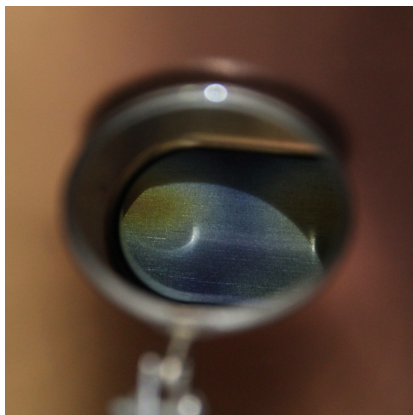
- ▶ Gradient at which spark rate $\approx 10^{-5}$ is > 40 MV/m. We need to verify with recent calibration data.
- ▶ Damage occurs where we expect it to occur.
- ▶ Lots of good microscopy coming out of the cavity now. See following slides.

First impression: very little visible damage!



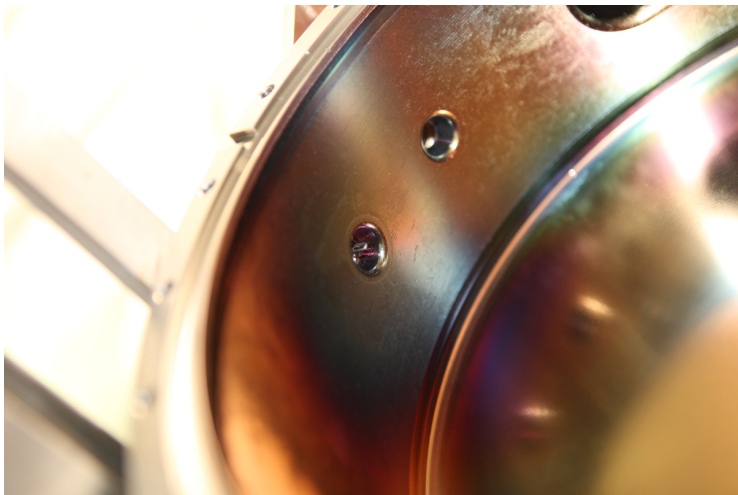
19 October 2015

No visible damage on input coupler.



19 October 2015
Images of input coupler via angled mirror

RF pickups look ok too.



We have also started looking at individual “pits” via digital microscope.

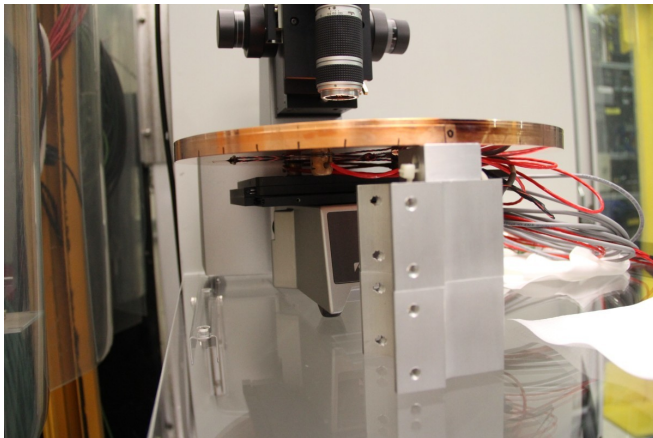
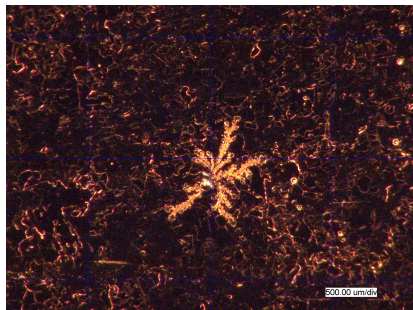
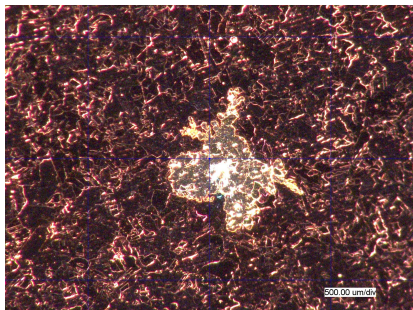
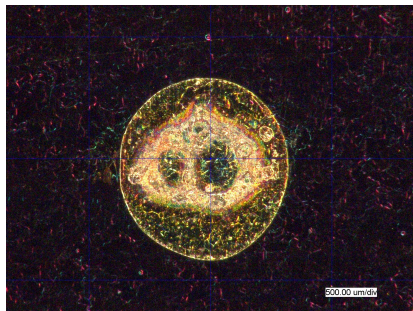
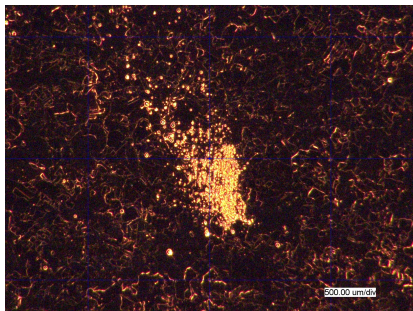


Figure : Note the edge has been marked in units of 10° .

So far, lots of variety. Very different from our experience with the All-Seasons and Pillbox cavities.



So far, lots of variety. Very different from our experience with the All-Seasons and Pillbox cavities.



Ongoing work

- ▶ Continue cataloging breakdown features
- ▶ Streamline inspection process w/ hardware tweaks?
- ▶ PO is out for beryllium plates.