Interesting Measurements

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MAP rf
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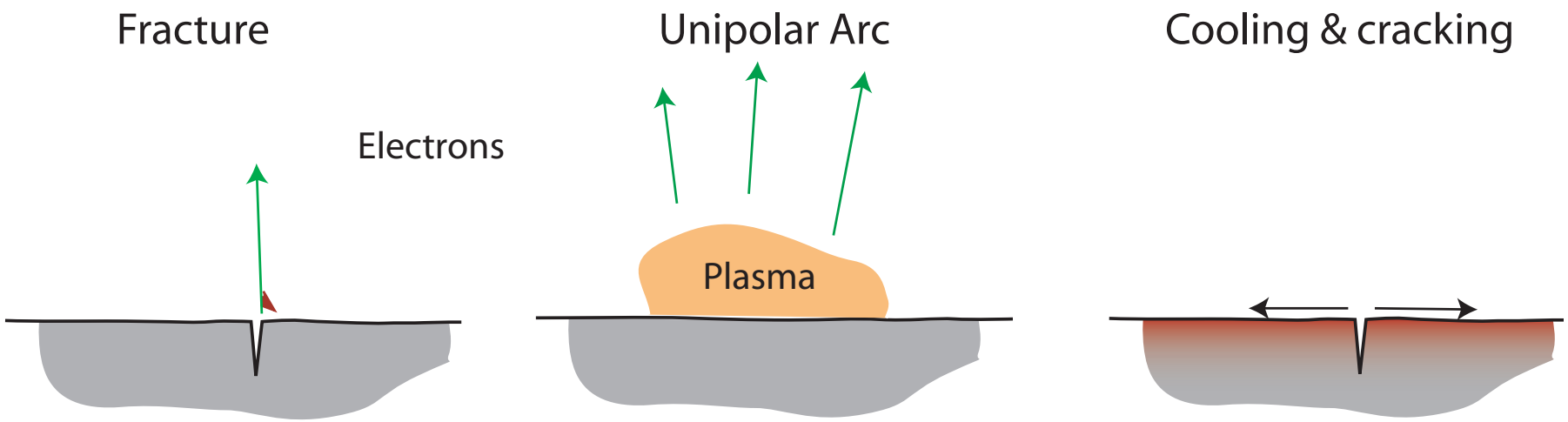
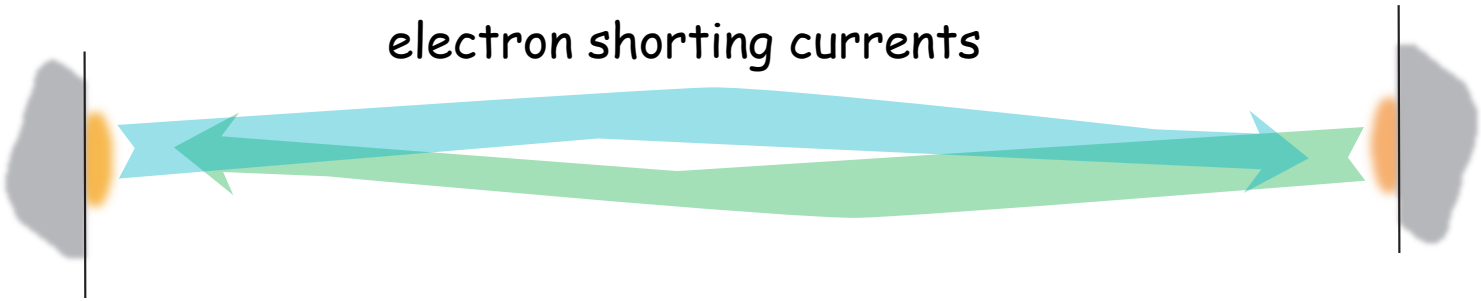
The Model

We find the simplest model explains everything. (lex parsimoniae)

The basic evolution of an arc is:



In a magnetic field it seems to look like this, with arcs on both sides:



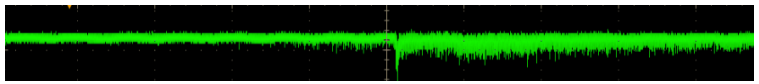
Measuring the location of the breakdown event

The rate at which energy can leave the cavity is a function of the shorting current.

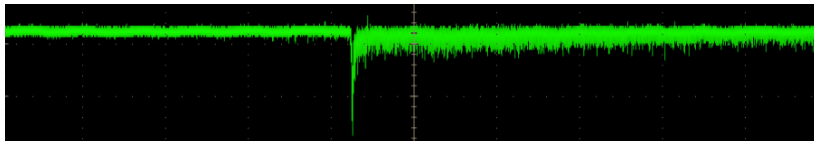
The current is driven by the local electric field.

The field (and discharge rate) should be highest in the center and low at the edge.

Center ? ?



Edge ? ?



We can measure the discharge rate from the rf waveform – and infer a radius.

Arcs in B fields could have twice the current and drop twice as fast.

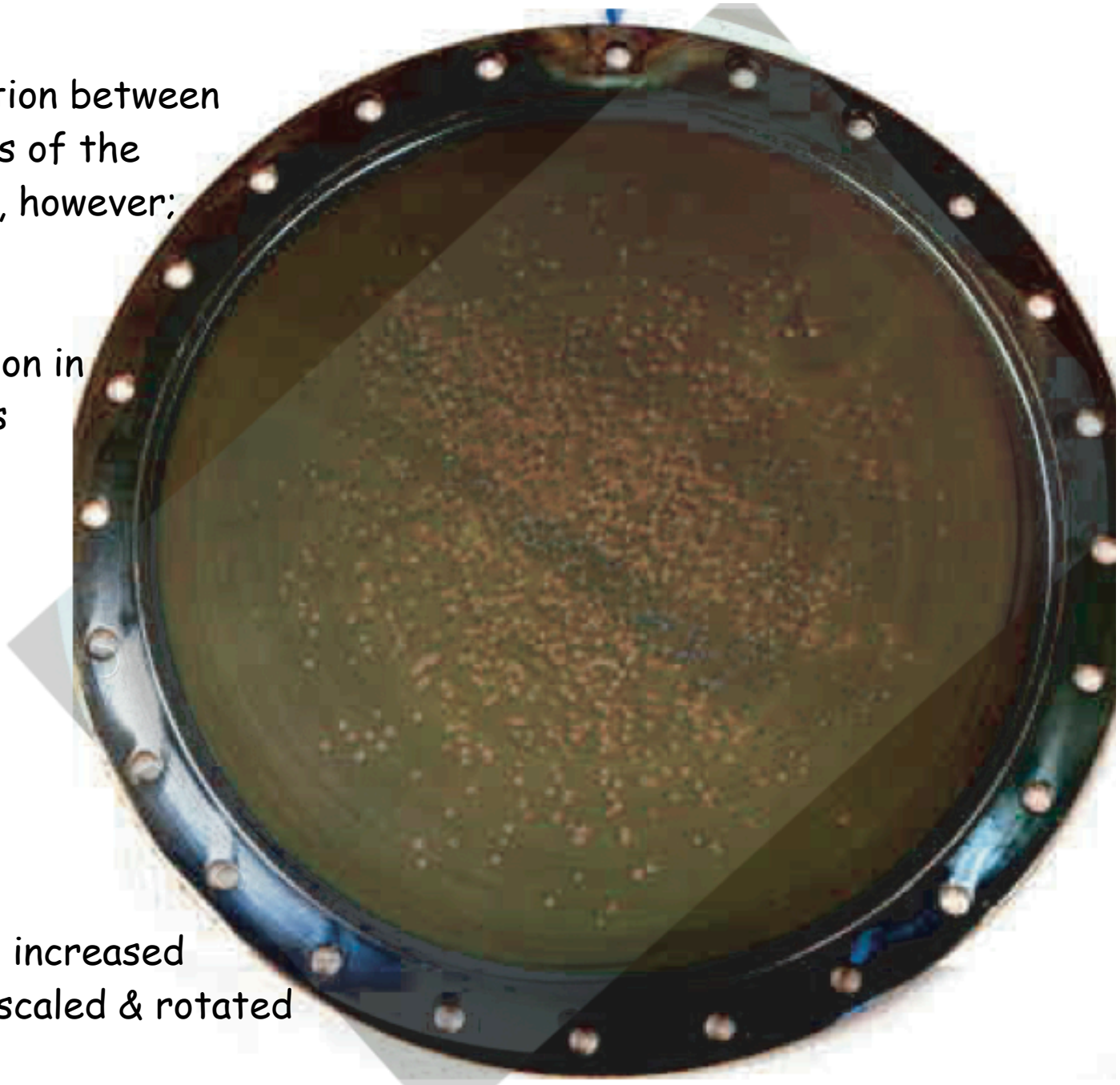
High Pressure operation may be similar.

Magnetic field effects appear in a number of ways:

Symmetry of damage

There is a close correlation between damage on opposite sides of the cavity. In the latest run, however;

- The gradients were anomalously low.
- The damage distribution in high gradient runs was quite different.



Two photos:

- 1) colors enhanced
- 2) reflected, contrast increased
  made transparent, scaled & rotated

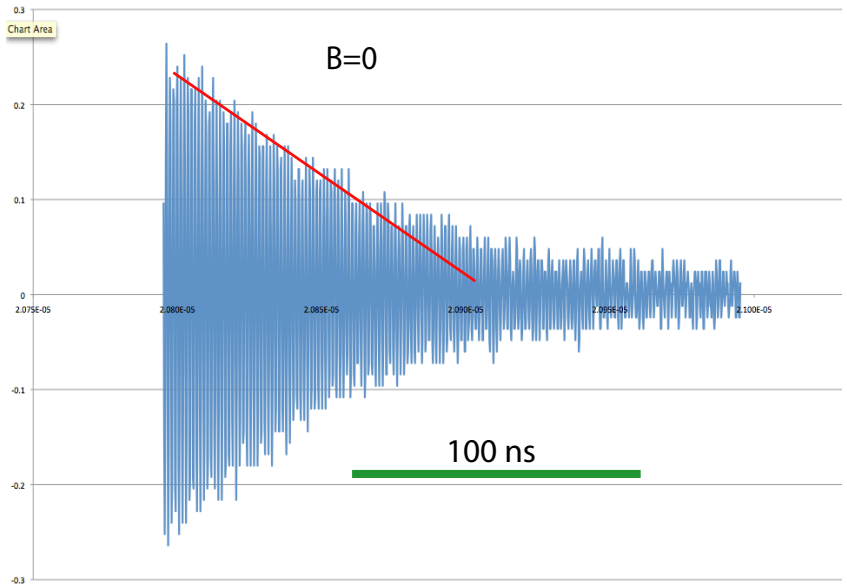
Energy loss in B fields might have two rates

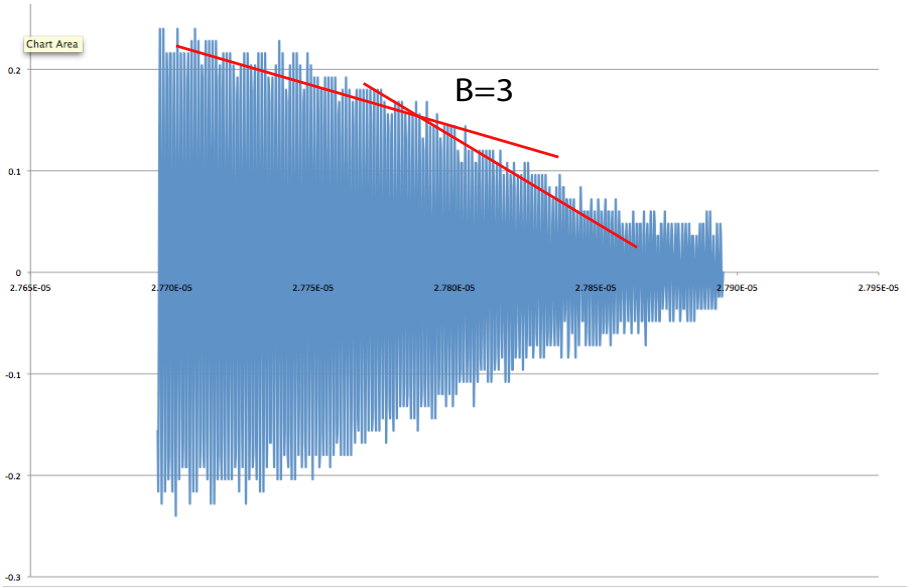
1) Discharge from one side
2) Disharge from two sides

B field may prevent arc growth.

The second arc may be delayed.

HPBD is naturally bipolar.





Breakdown Rates

Breakdown rates go like ~E^{30} for CLIC type cavities.

Three separate models predict this behavior.

Not a definitive experiment

Ours should be similar. We should measure at least two points to verify this

We should verify that our cavities are governed by the same mechanism.