

## QUESTIONS FOR THIS WORKSHOP

1. What does it take to produce an rf breakdown event? [As distinguished from surface damage]

A. Field emission  
[Multipactor, Pulse Heating]

B. Surface problems

i. Protrusions

ii. Crystal boundaries with inclusions

iii. Surface impurities, dust, etc.

iv. Gas emission from bulk leading to ionized plasma

v. Ambient gas, i.e. poor vacuum

Is there an rf frequency dependence other than via the pulse length?

$$t_{\text{fill}} \sim \omega^{-3/2}$$

Fowler-Nordheim shows no rf frequency dependence!

2. Once breakdown occurs, what parameters affect the damage?

i. Does the structure length matter?

ii. Power, energy, impedance,  $v_g/c$  questions?

How much damage is made by one arc? Does it vary?

Can there be several arcs at different locations within one rf pulse?

iii. Does the damage depend on the surface condition? the plasma formation?

iv. Does the maximum achievable gradient depend on the rf conditioning pathway?

i.e. variable pulse amplitude or length?

3. What can we do to get to higher gradients at any given frequency?

- i. Better treated surfaces ?
- ii. Smarter of conditioning
- iii. Different structure design  
[ Lower group velocity,  
Shorter sections ]