High Voltage DC Processing of Accelerator Structures

- Premises:
  - Almost all breakdowns are caused by materials other than copper
  - Removing these materials could:
    - Enable structures to be processed faster
    - Enable higher RF gradients to be attained
  - Nose and single cavity results are not necessarily applicable to structures

- Limitations on RF Processing
  - On-time accumulates slowly (~ one second per day)
  - Limited number of RF stations
  - De-install/re-install time long
  - Control of joules per breakdown limited

- Klystron Department is acquiring and installing a 450 kV DC supply and oil tank
  - Using this for the processing of structures would:
    - See if DC processing helps RF performance
    - Control joules per breakdown more readily
    - Accumulate processing time quickly versus RF (~ $10^4$)
    - Allow us to reverse polarities
    - Utilize a totally completed and processed full-length structure
    - Selectively process sections of the structure
    - Test the impact of simple gas processing
Six Key Areas on the DC High Voltage Processing of Structures

1. The philosophical and resource question of whether we want to do it

2. The design of the electrode inside the structure

3. Making sure we can live with the vacuum conductance along the inside of the structure with the electrode in place

4. Maintaining the centering of this electrode while it is inserted into the structure and while it is being high voltage processed

5. Maintaining the high voltage standoff between the electrode and the structure concurrently with the centering

6. Putting all this in a vacuum–tight and high-voltage-safe container