



Yes Virginia, There are Superconductors

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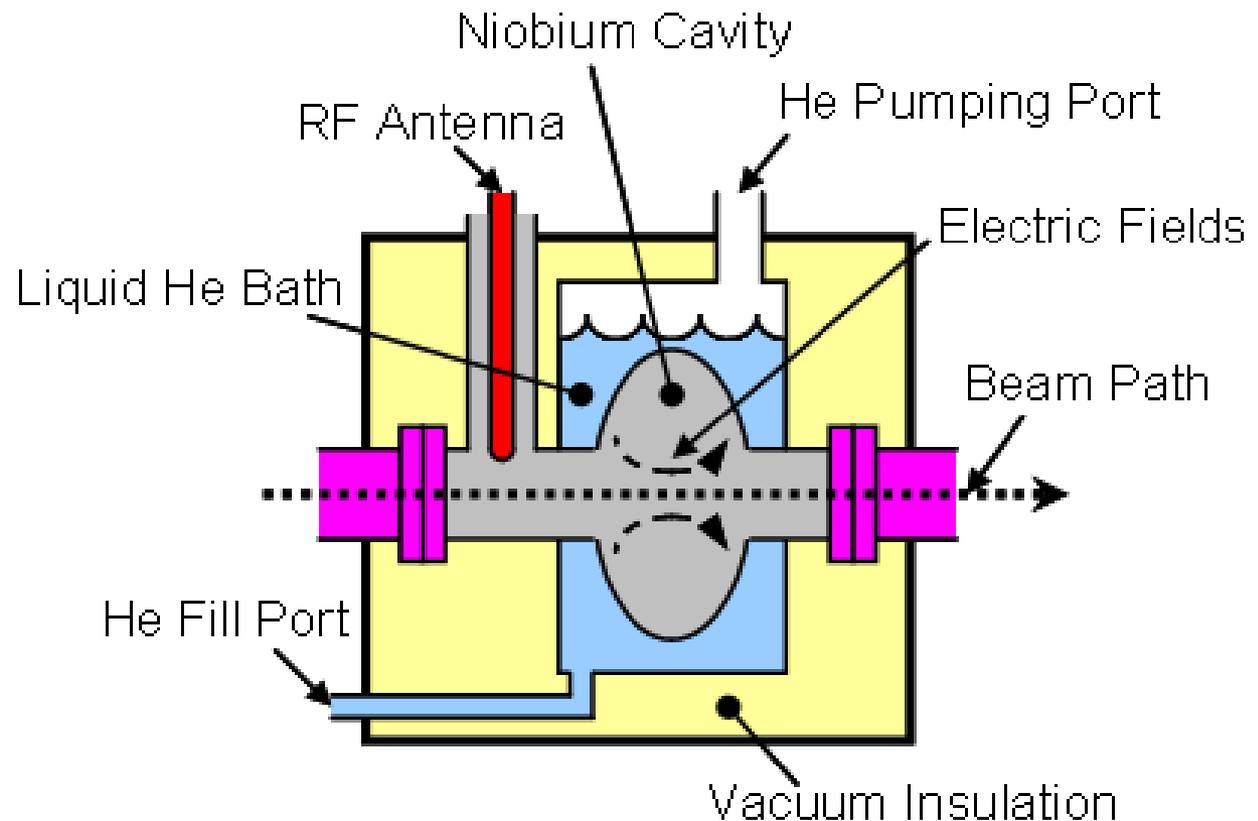
CLASSE, Cornell University

June, 25 2010



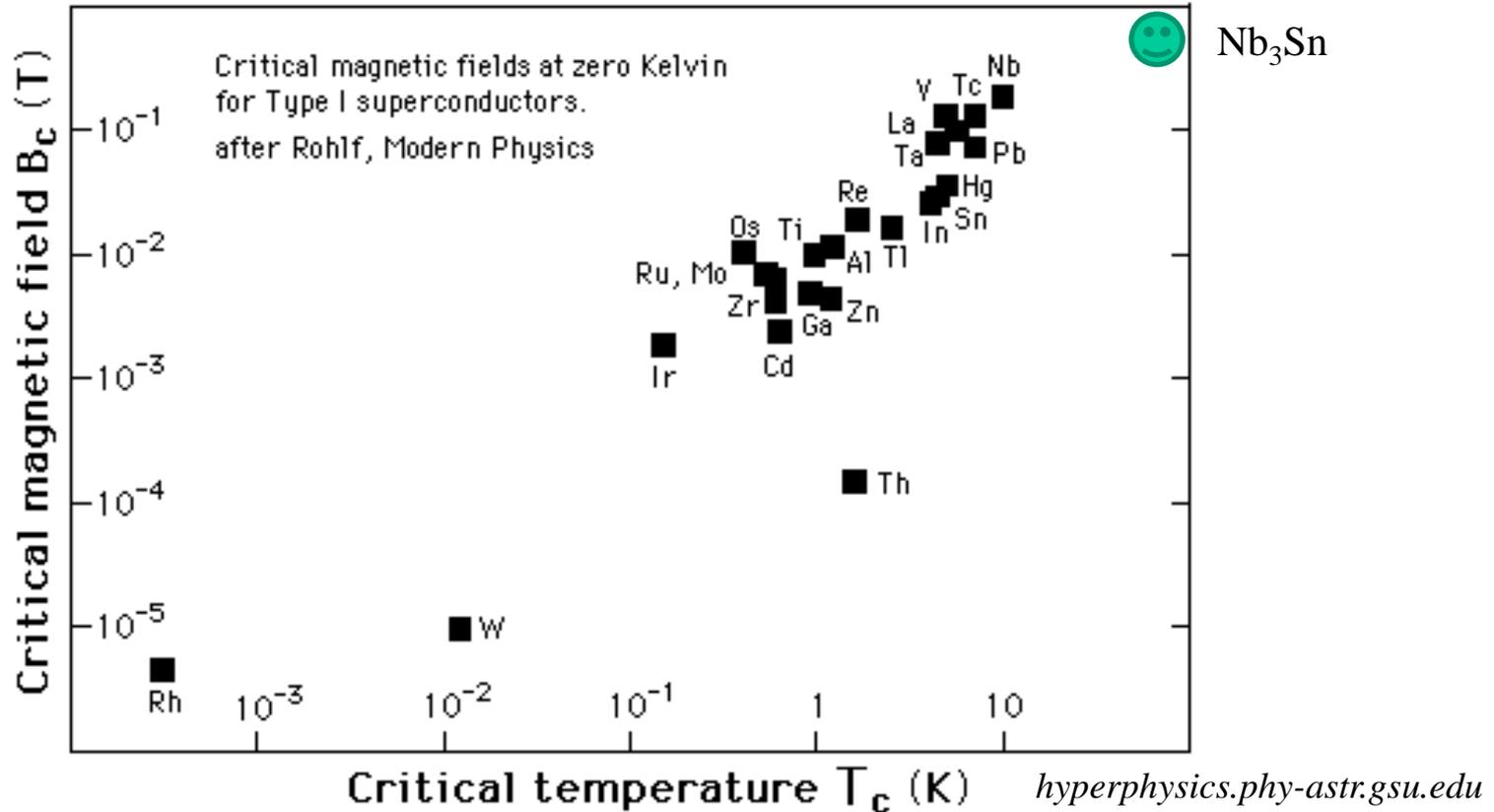


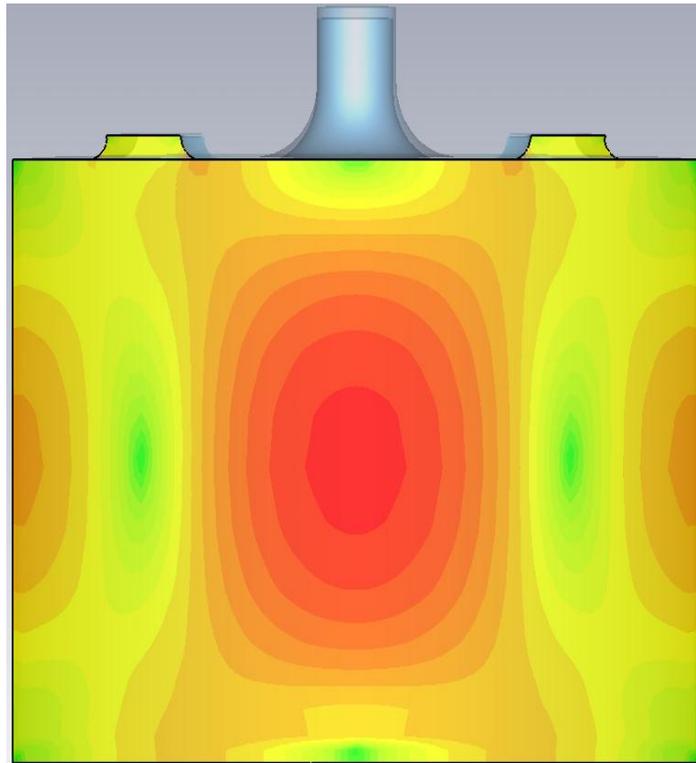
- Used to accelerate particles
- Often made of superconductors
- 300 RRR Niobium is currently used





- Superconducting RF cavities have limitations
- Tests under high magnetic fields are required
- Niobium host cavity needed





B-field Magnitude

4.88×10^{-7}

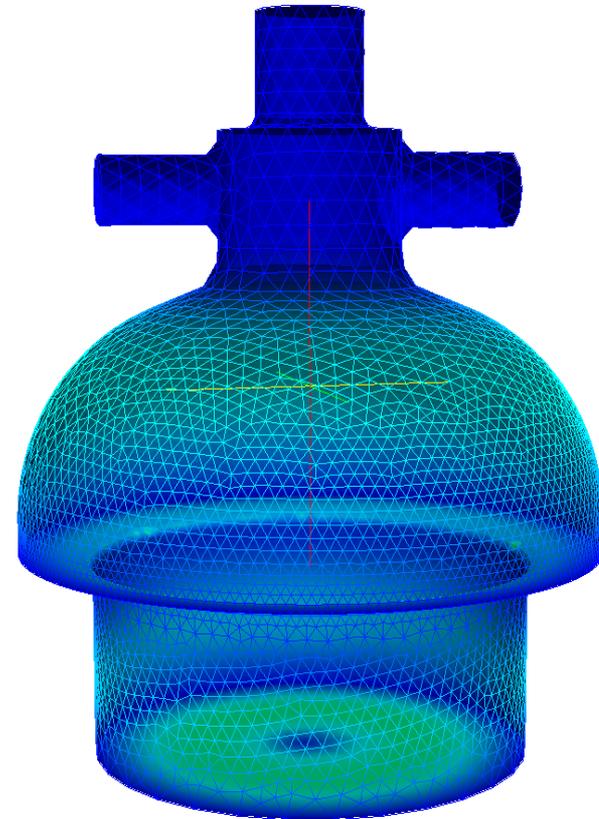
4×10^{-7}

3×10^{-7}

2×10^{-7}

1×10^{-7}

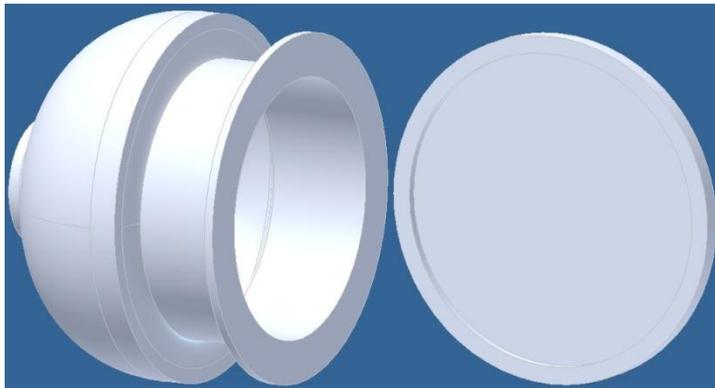
3.38×10^{-14}





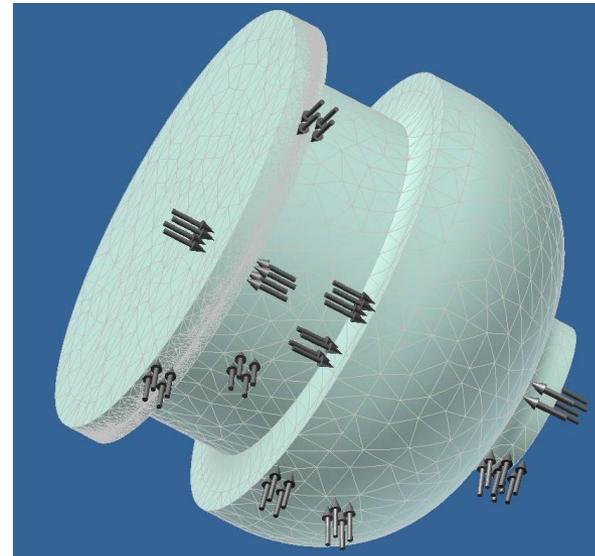
Create Part

- 2D Sketch
- Rotate sketch
- Assemble parts
- Define material



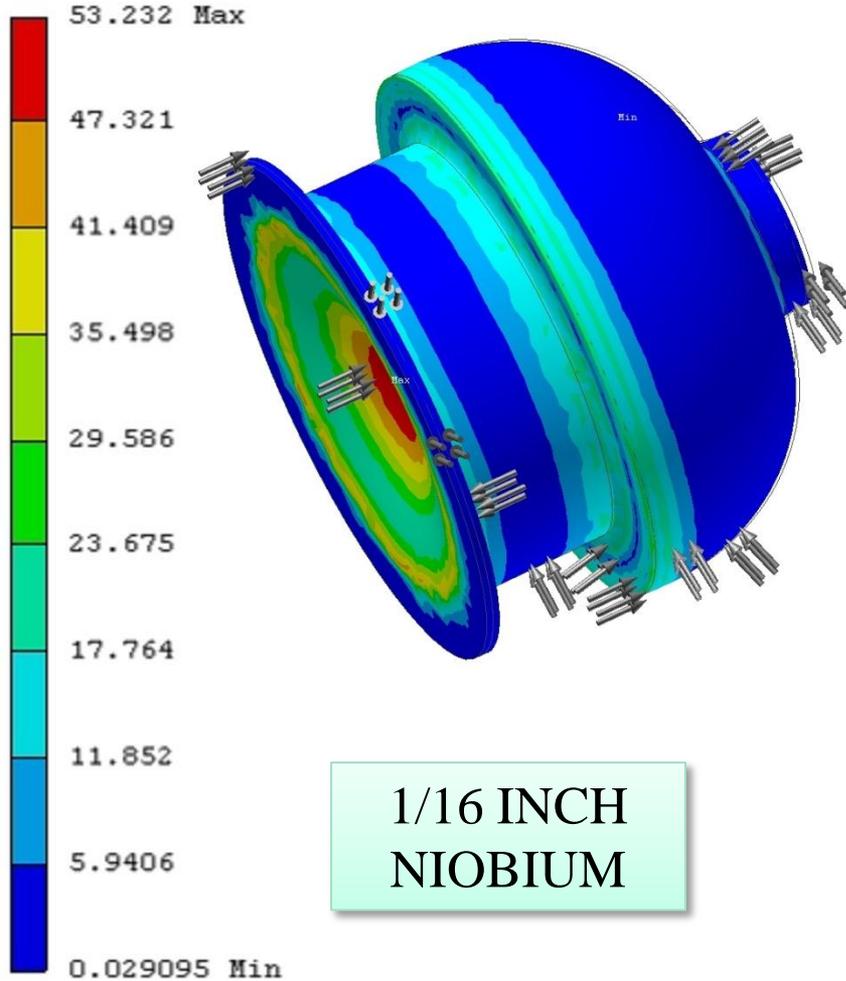
Run Analysis

- Define stress
- Define constraint
- Set mesh

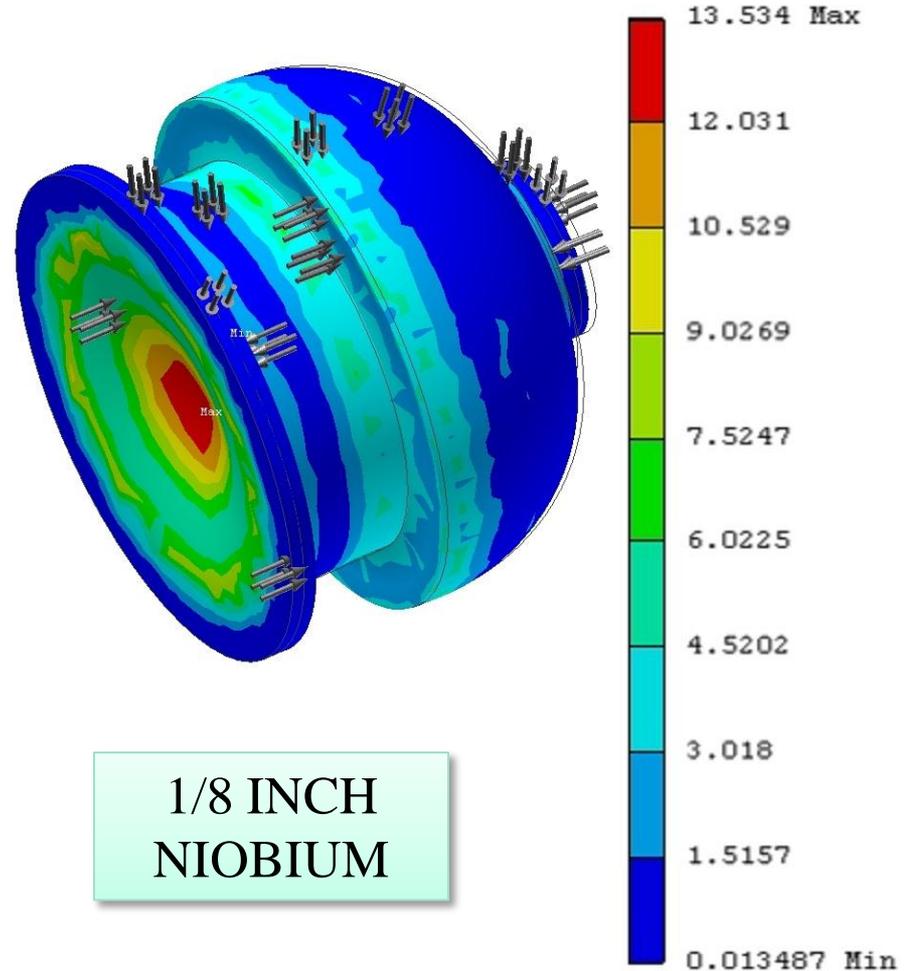




Equivalent Stress
Type: Equivalent Stress
Unit: MPa
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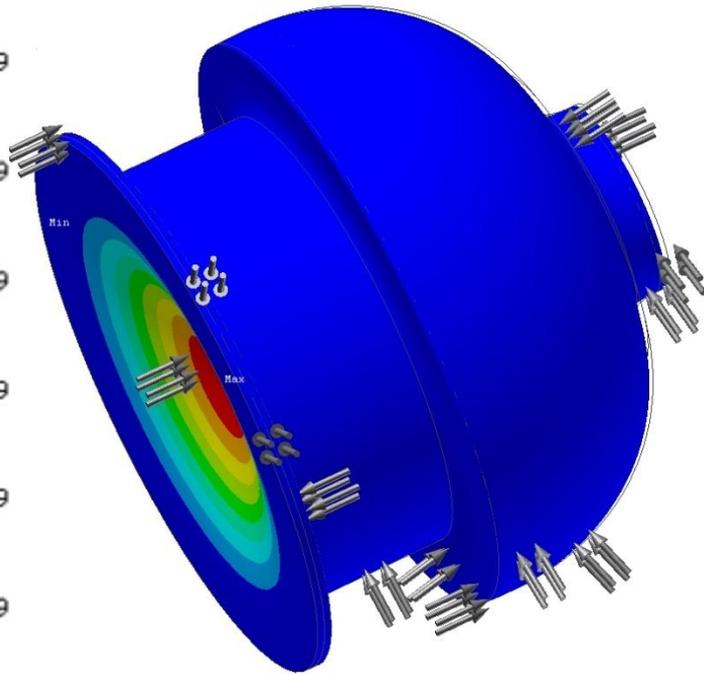
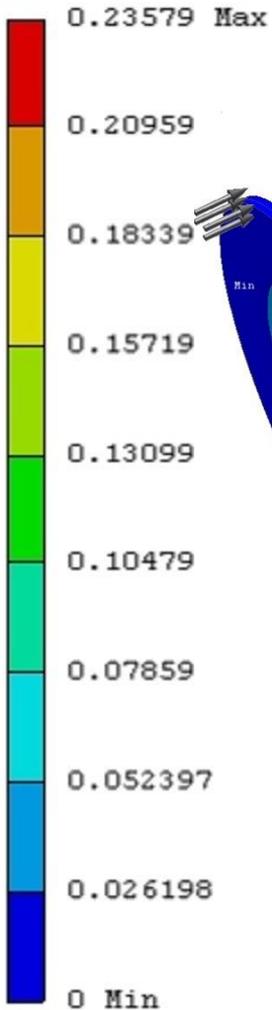
Equivalent Stress
Type: Equivalent Stress
Unit: MPa
6/22/2010 3:07 PM



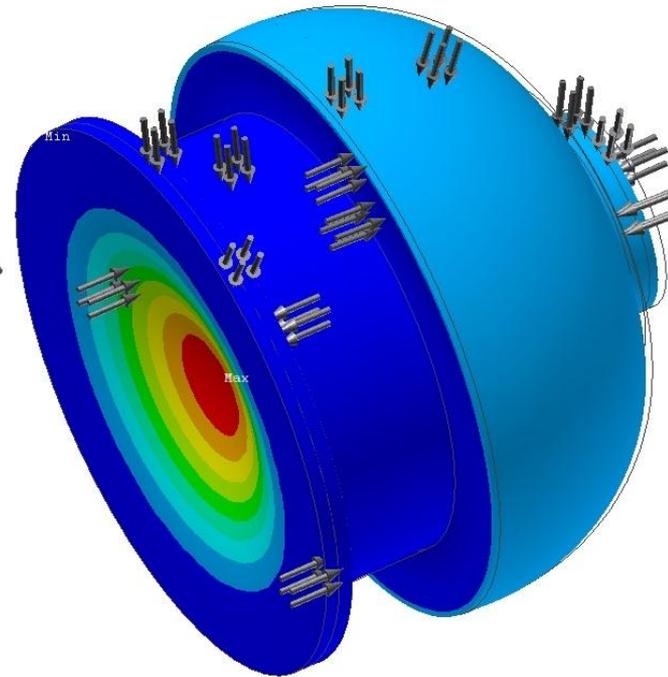


Deformation
Type: Deformation
Unit: mm
6/22/2010 2:36 PM

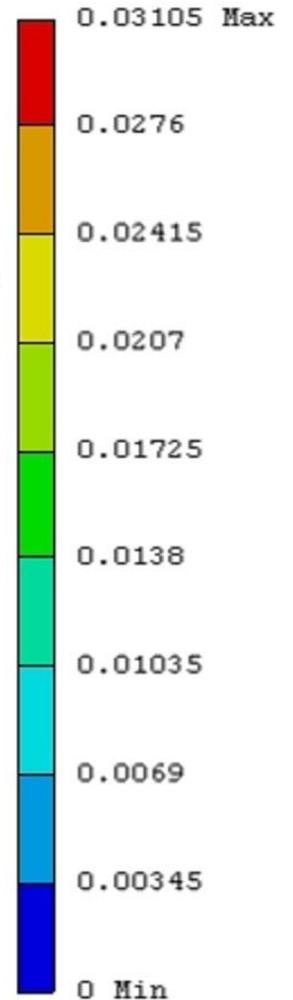
Deformation
Type: Deformation
Unit: mm
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1/16 INCH
NIOBIUM



1/8 INCH
NIOBIUM



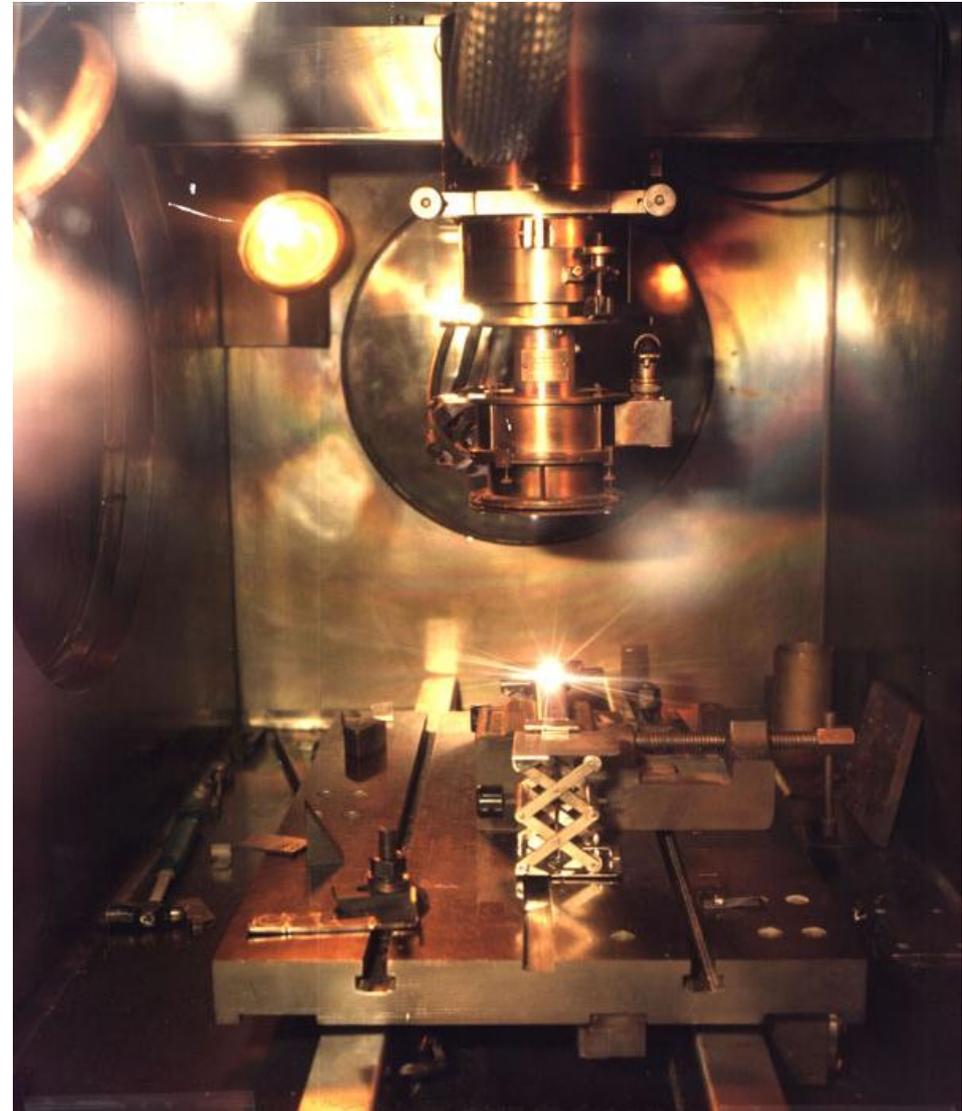


Importance of Stress Analysis



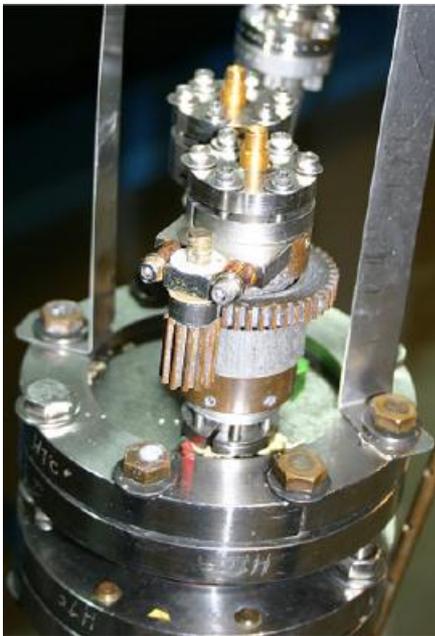


- Perform a test of an old pill box cavity
- Complete fabrication of a mushroom cavity
 - Have a blank of the cavity shape created
 - Have the pieces welded together





- Prepare the cavity for testing
 - Have the surfaces of the cavity chemically treated
 - Have the cavity rinsed in the clean room
- Perform a test of the mushroom cavity



Enjoy the
Summer!

