201 MHz Superconducting RF Status

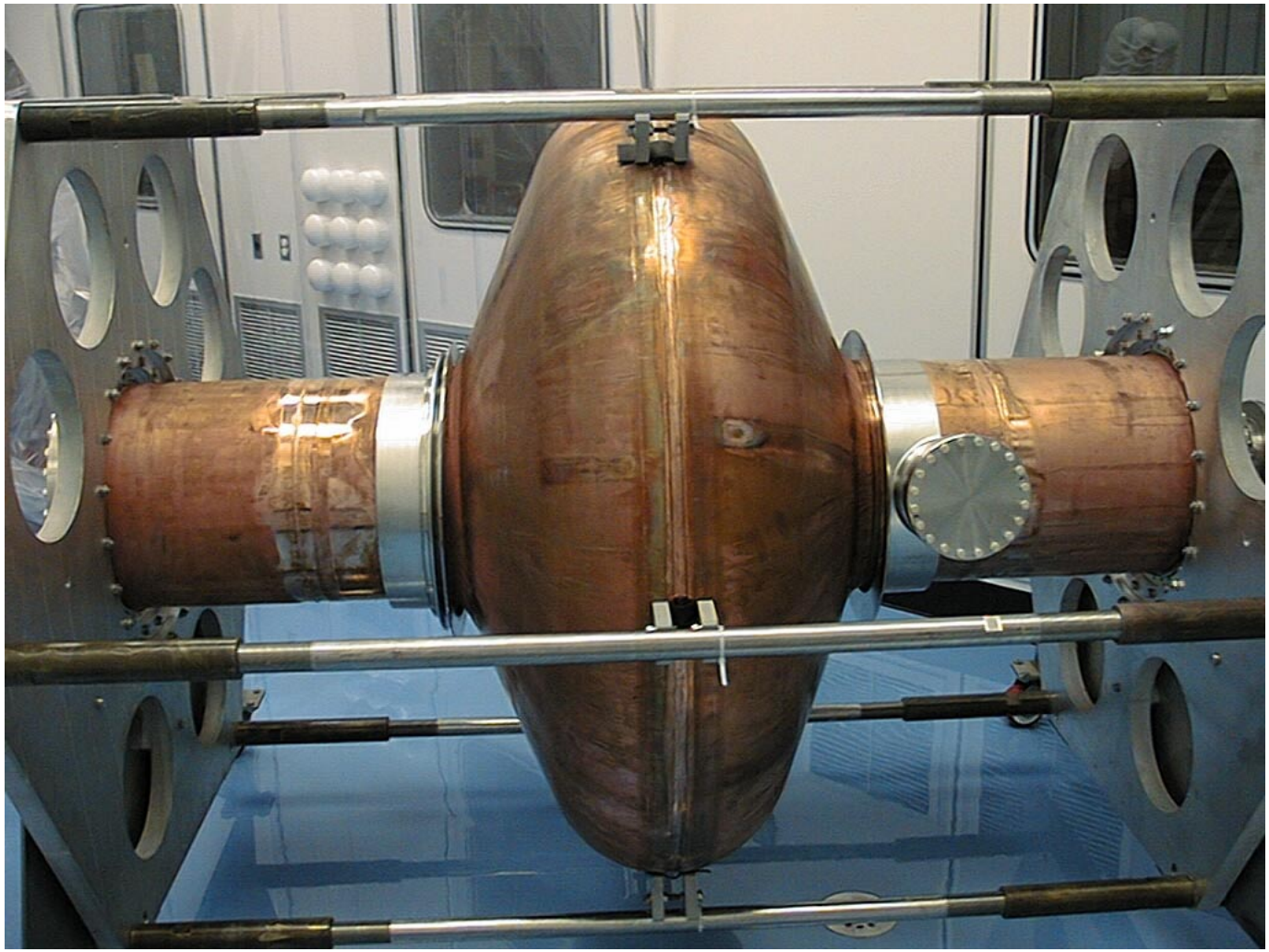
Muon Collaboration Meeting

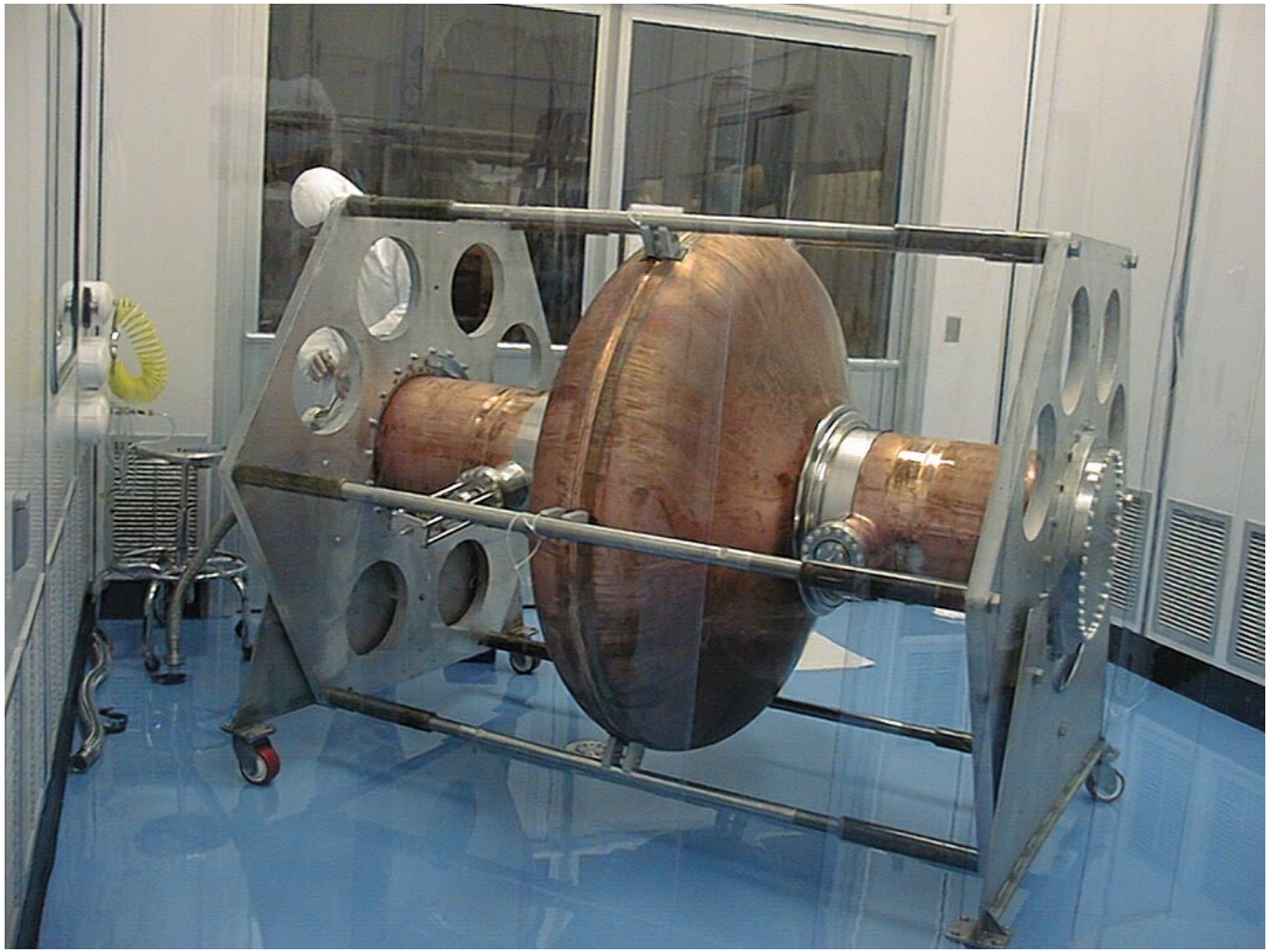
Shelter Island, NY- May 10, 2002

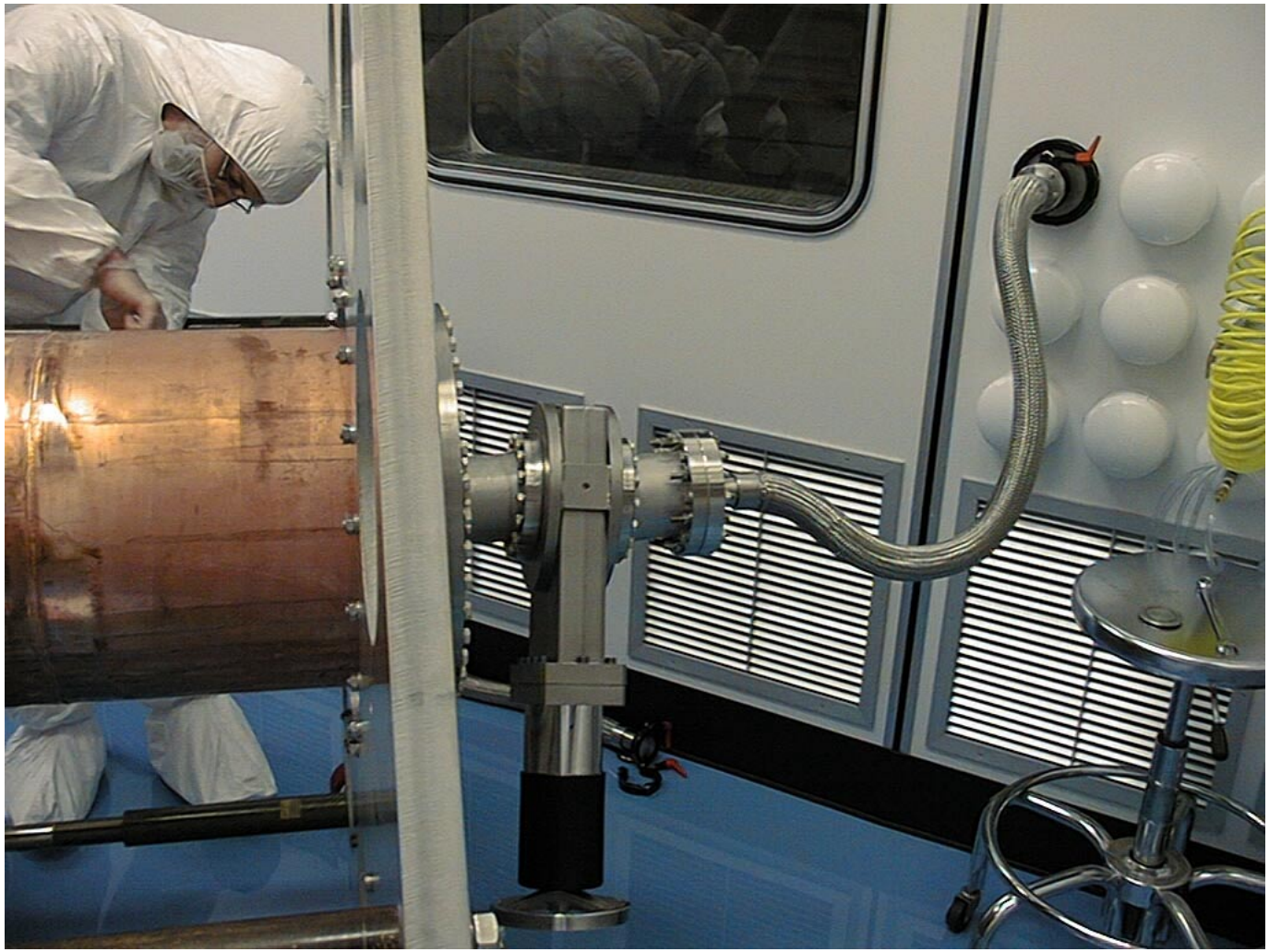
Don Hartill for the Cornell SRF Group

Outline

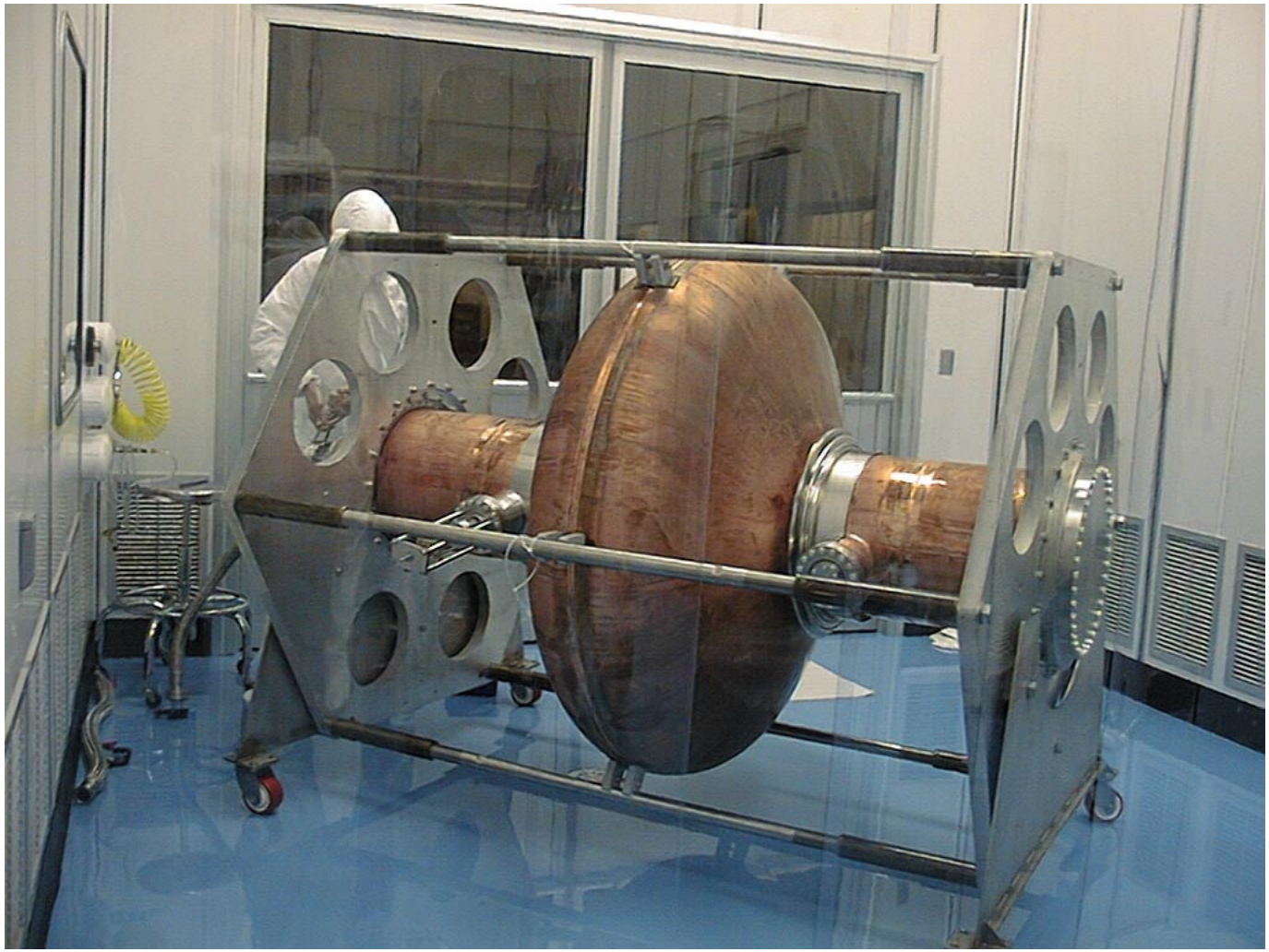
- A Few Pictures
- Issues and Expected Performance
- Likely Schedule
- Future

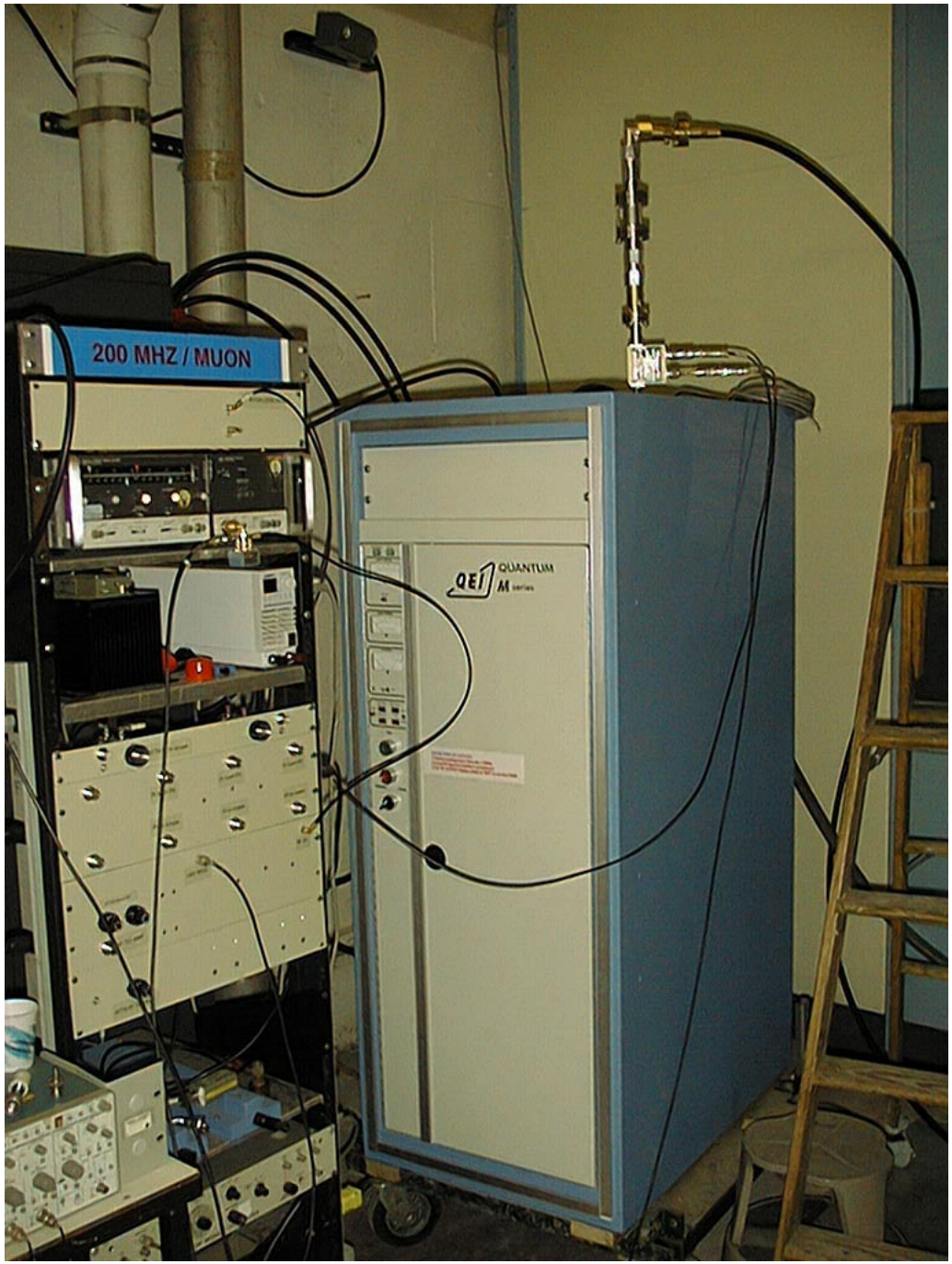







CRYOFAB




200 MHZ / MUON
QEI QUANTUM M series

Budget for Surface Resistance of 201 MHz Cavity

- Two components of resistance - BCS and residual (due to magnetic field)
- From CERN 350 MHz cavities $R_{mag} = 0.15$(nohm/mOe)
- With sqrt frequency dependence and with measured field of 200 mOe in test pit expect $R_{mag} = 23$ nohm
- BCS resistance is 32 nohm at 4.5 K and 2 nohm at 2.5 K
- With geometry factor of cavity of G = 250 ohms this gives $Q_o = 4.6 \times 10^9$ at 4.5 K and 1.0×10^{10} at 2.5 K
- In addition, NbCu cavities have a “Q Slope” requiring x3 power at 15 MV/m accelerating gradient

- At 4.5 K with 1600 W of available power, have > 600 W margin even with 430 mOe residual field at 15 MV/m. Present shielding is soft iron from leftover sheet for CESR Quadrupole laminations.
- Input coupler is adjustable to give Q_{ext} from 2 x 10^9 to > 2 x 10^{10} so that cavity can be operated critically coupled.

Likely Schedule

- Mount Cavity on stand, insert in cryostat in pit, and connect to RF amplifier and instrumentation - complete by June 15.
- Cool down and test (requires 5000 liters of LHe) by end of June.
- Expect to have to recoat with Nb to reach 15 MV/m.
- About to have fun…..

Future Plans

- Expect to achieve 15 MV/m accelerating gradient and go as far as possible towards a usable cavity.
- Exploring spinning cavity from a single piece of Cu - we have a 500 MHz cavity at Cornell made at INFN which we plan to have Nb coated at CERN after we install needed ports.
- Exploring advanced ion assisted coating techniques to try to reduce “Q Slope” and achieve higher gradients.
- Continue our efforts on trying to understand RF breakdown in both warm and cold cavities.

Cavity Prep	**100000**					
He Pumping	**25000**					
Shielding and Interlocks	**300000**					
Cavity Tuner		**50000**				
He Vessel for 1st Cavity	**20000**					
Improved Nb/Cu Cavity	**200000**					
Input Power Couplers+Windows	**109703**	**36295**				
Recoat Cavities		**20000**				
Complete Cryostat			**50000**			
Fab & Test Tuner&Coupler			**100000**			
High Power Test Eq.			**30000**			
Recoat Cavity			**20000**			
Vac. & Inst. For Cryostat			**50000**			