



201 MHz Cavity Design and Plan

MUCOOL Collaboration Meeting at LBNL
(October 23, 2002)

Derun Li

J. Corlett, A. Ladran, R. Rimmer*

J. Staples, M. Zisman

Center for Beam Physics

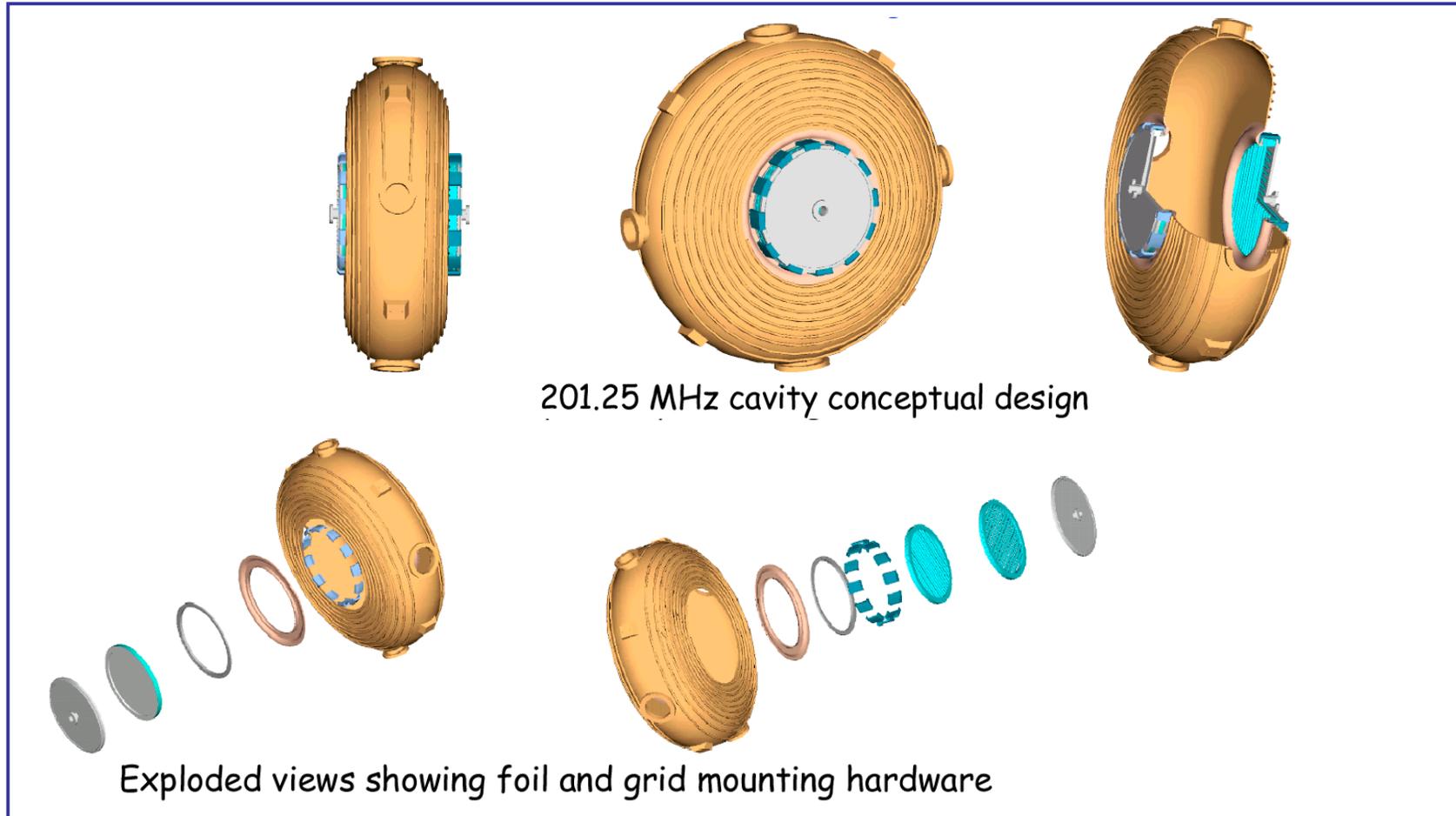
Lawrence Berkeley National Laboratory

* Jefferson Laboratory

201 MHz cavity for MUCOOL

- Why do we need to design 201 MHz cavity
Non-existing technology and needs R&D efforts:
high gradient, engineering issues, Be windows or
grids to terminate RF fields, thermal and
mechanical issues of Be windows or grids
- Cavity Parameters
 - cavity frequency: 201.25 MHz
 - high shunt impedance for a given cavity-space
 - 16 MV/m peak acceleration gradient
 - ~ 40 cm diameter flat Be windows or grids

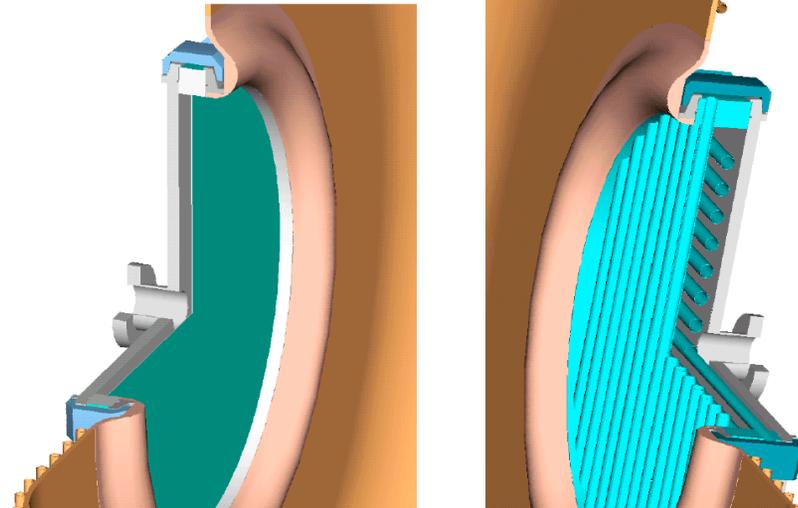
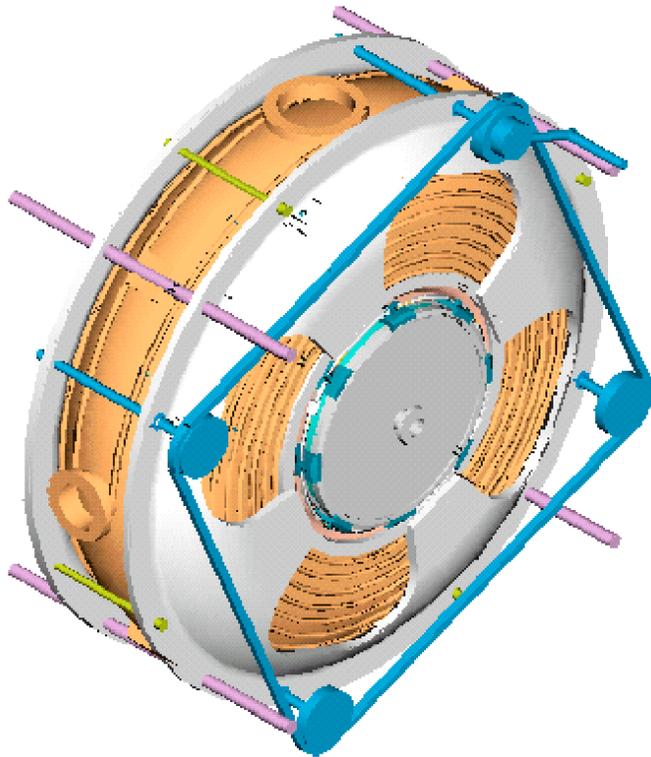
Recent Cavity R & D efforts (1)





ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY

Recent Cavity R & D efforts (2)



Preliminary cavity design with water cooling channels and tuning mechanism. This cavity design accommodates either Be windows or a grid design.

MUCOOL at LBNL
(10-23-02)

201 MHz cavity design & plan
Derun Li

Center for Beam Physics
LBNL Page 4

Recent Cavity R & D efforts (3)

- Cavity design allows for demountable Be windows or grids design
- Using ANSYS code to study the mechanical and thermal and mechanical issues of grids designs (in progress)
- Engineering design issues (more details will be given in A. Ladran's talk at MICE meeting tomorrow)
- Better understanding of the grid designs:
RF designs of the cavity with grids: options of grids [*EM* fields termination] (Talk by J. Staples)

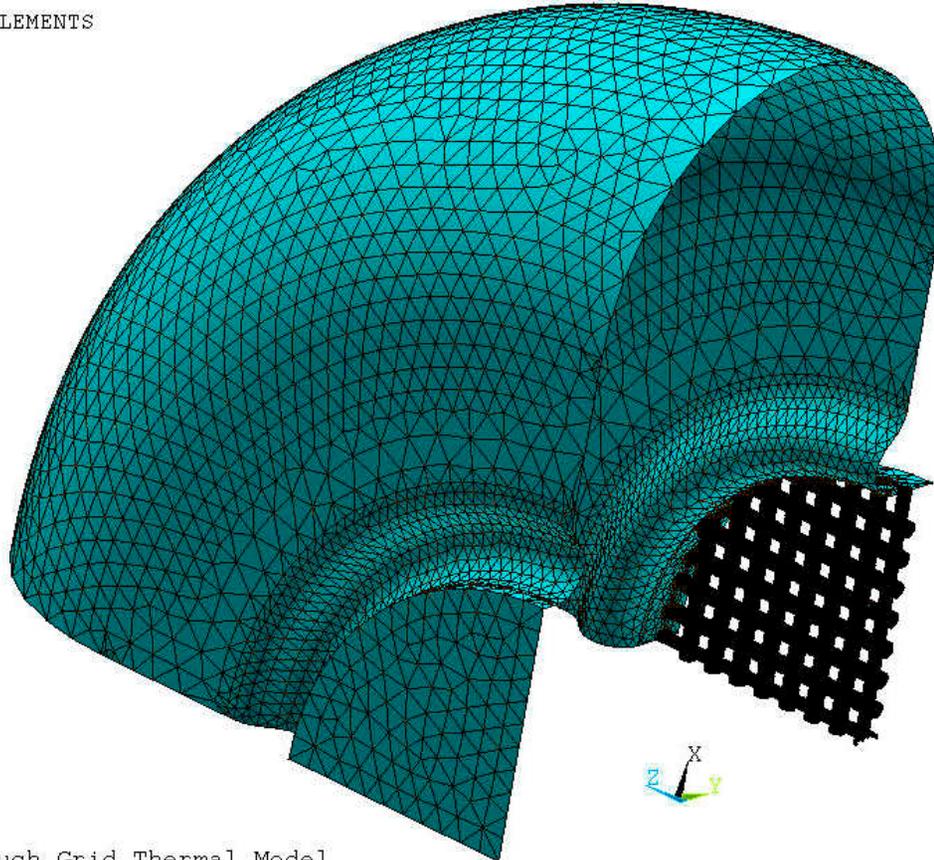


ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY

ANSYS simulations: model



1
ELEMENTS



ANSYS
OCT 18 2002
12:07:28

Touch Grid Thermal Model

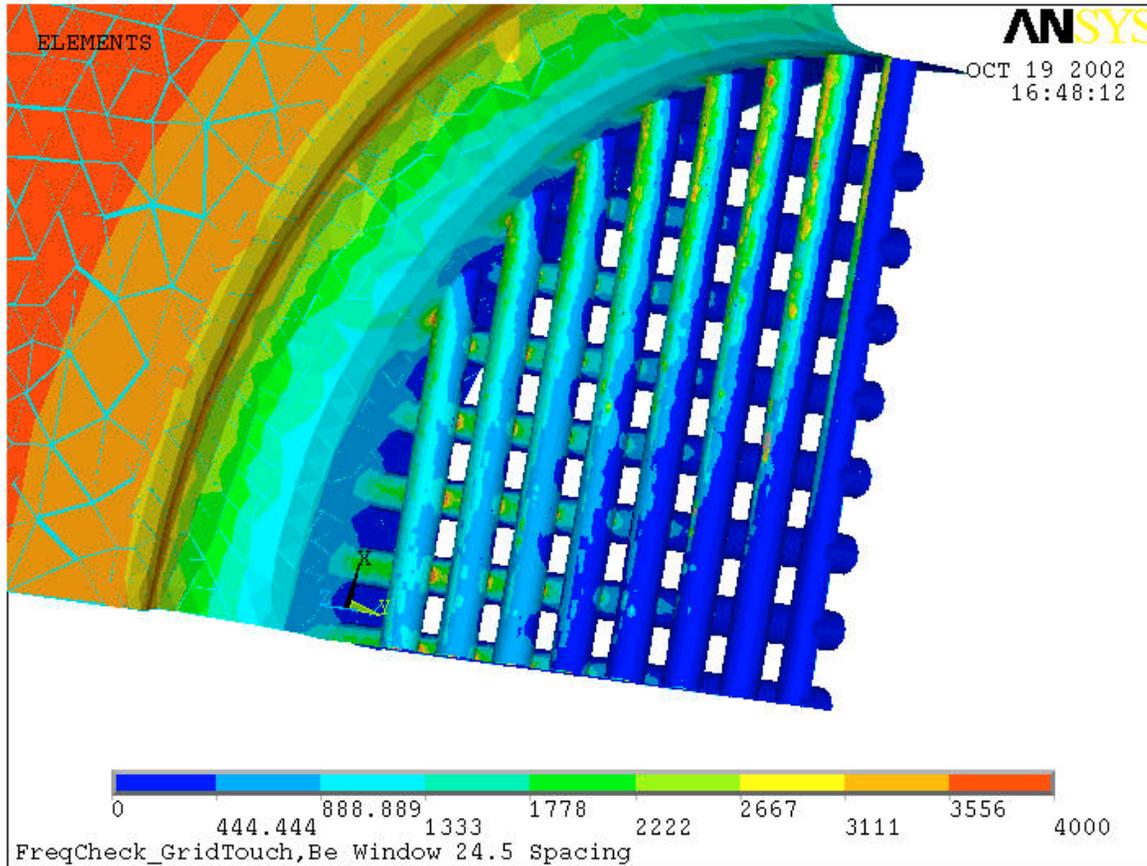
Large ANSYS model with over 1 million elements
Thermal load is obtained directly from the EM fields simulated by the code → more accurate power dissipations and field distribution on cavity surface.

MUCOOL at LBNL
(10-23-02)

201 MHz cavity design & plan
Derun Li

Center for Beam Physics
LBNL Page 6

ANSYS: thermal load



Thermal load calculated by ANSYS code in unit of watts per m^2 (in good agreement with results from MAFIA simulations. Thermal modeling is underway.

Plans for near future

- Complete thermal modeling of the grids
- Optimization design of grids
- Explore engineering designs and manufacturing issues of the grids designs
- Start cavity prototype if budget allows
- Cavity integration
- Coupler design
- Tuner options and designs

Conclusion

- 201 MHz cavity design for MUCOOL is in good enough shape
- Cavity prototype is ready to start, current cavity design allows for using either Be windows or grids
- Cavity geometry is optimized, small changes are still possible
- The current cavity design can be used for MICE
- 805 MHz cavity test at Lab G is necessary to understand cavity conditioning and radiation issues