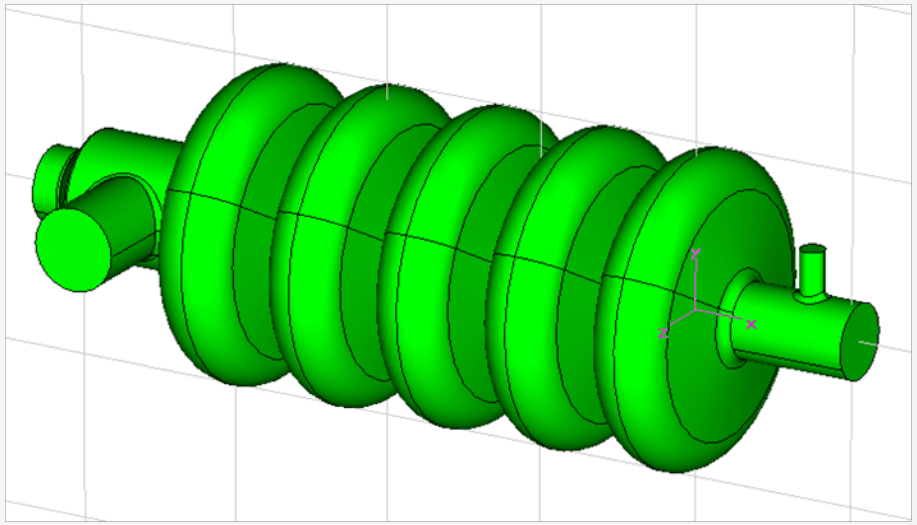
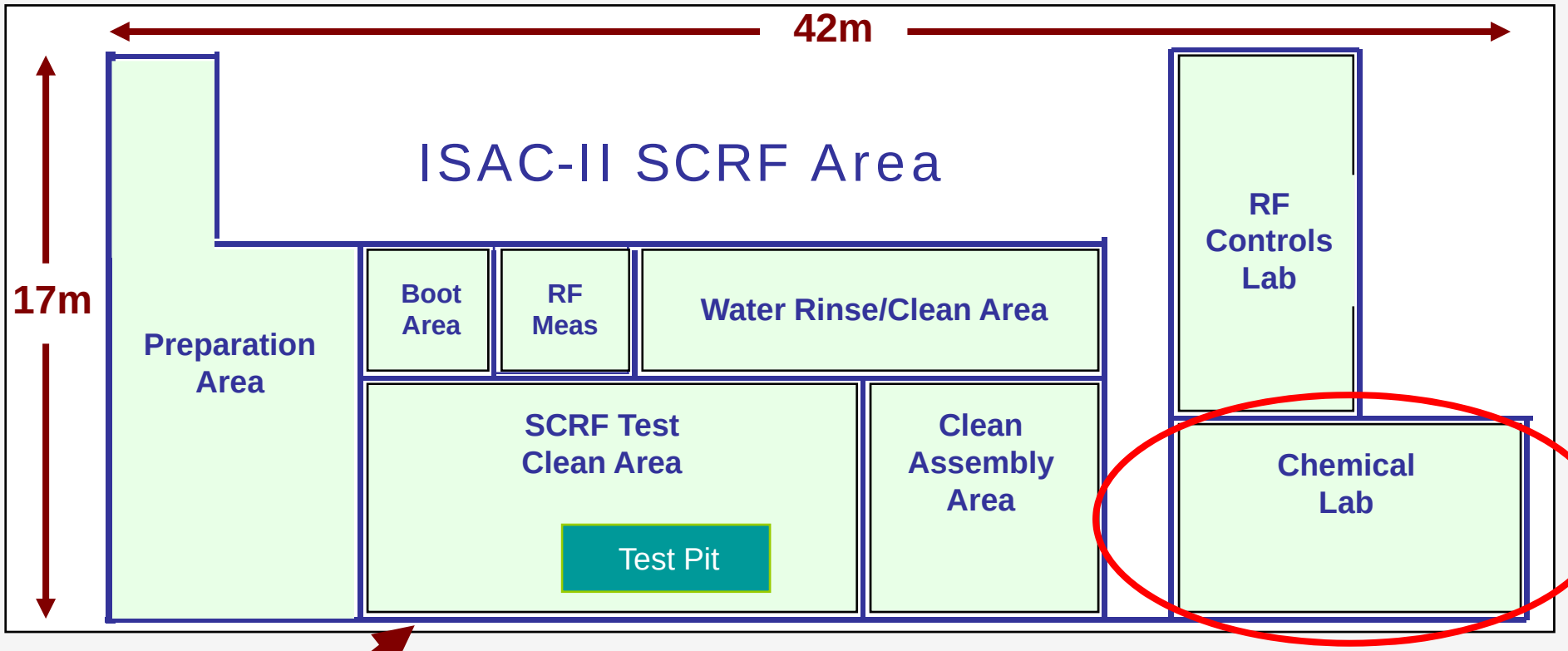


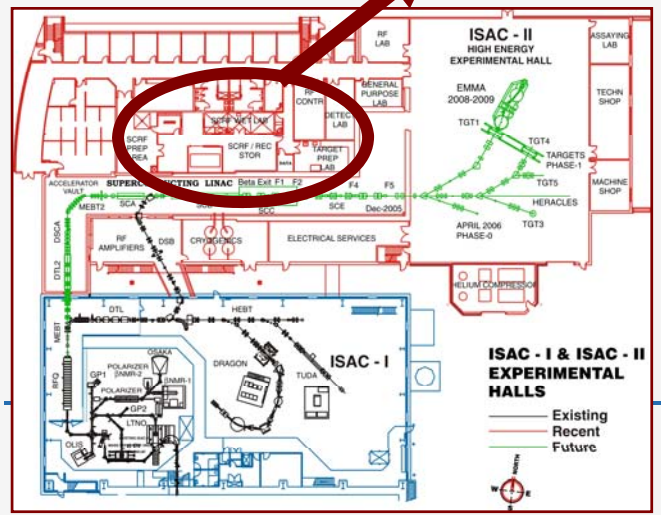
The TRIUMF SPL Program Update

Bob Laxdal, TRIUMF, SRF Group Leader

Infrastructure Upgrade

SCRF Infrastructure

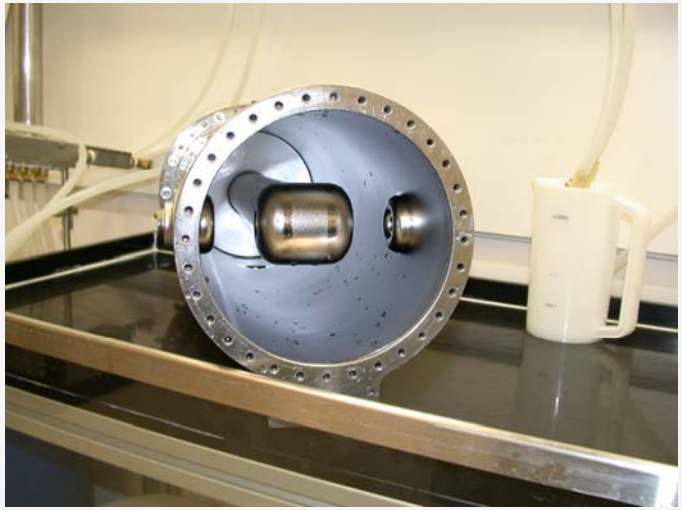




- The ISAC-II building houses the SCRF test and assembly areas
  - 500m^2 of floor space, overhead crane
  - Ultrasound cleaning tanks, High Pressure Water Rinse area, shielded rf test area, cryomodule assembly area, chemical etching lab
  - Over 40 single cavity tests performed and five cryomodules assembled since 2004

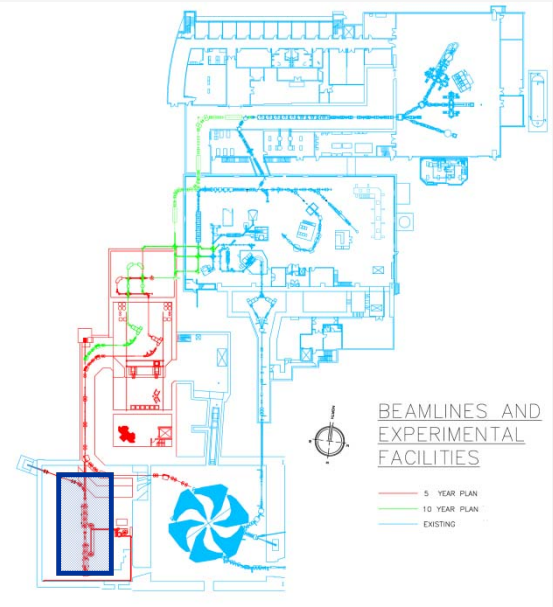
BCP Processing Lab Opens

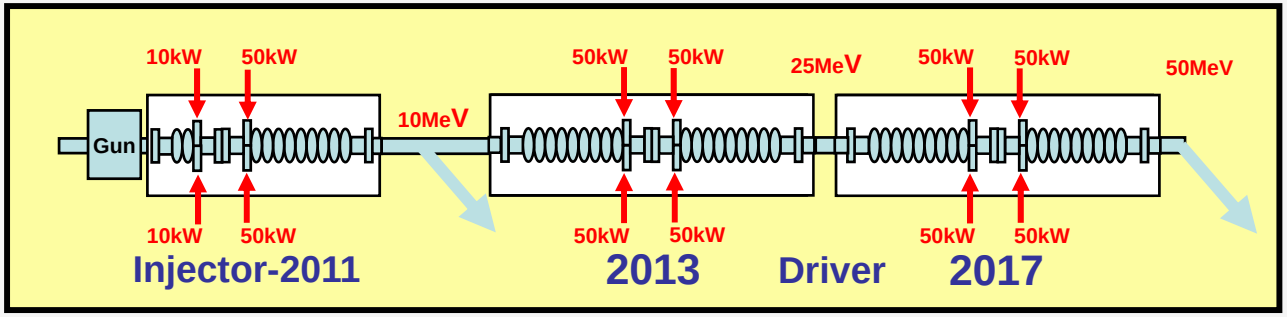
- Now operational
- Large fume hood accepts ISAC-II quarter wave cavities and elliptical cavities to ~1.5m in length
- Six production cavities processed plus parts etched prior to welding for production series



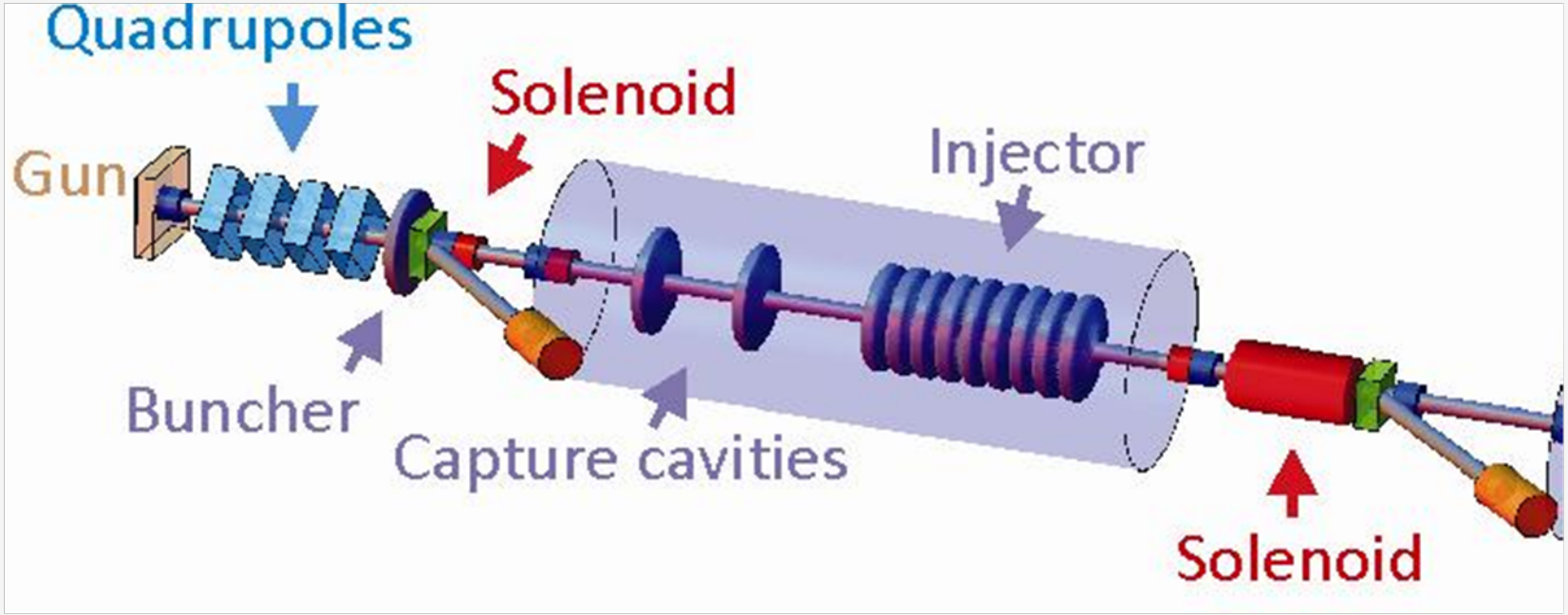
E-LINAC

- **Electron driver for photofission: independent and complementary to 500 MeV cyclotron**
  - **Composed of five elliptical cavities at 1.3 GHz**
  - **Final specification 50 MeV/10mA ->0.5 MW beam power, cw – by 2017 (cash flow dependent)**
- **Staged installation: 25-30 MeV and 3 mA - 2013**
- **Injector cryomodule (ICM) - designed, built and tested as part of the VECC collaboration - 2011**





E-Linac Injector Cryomodule

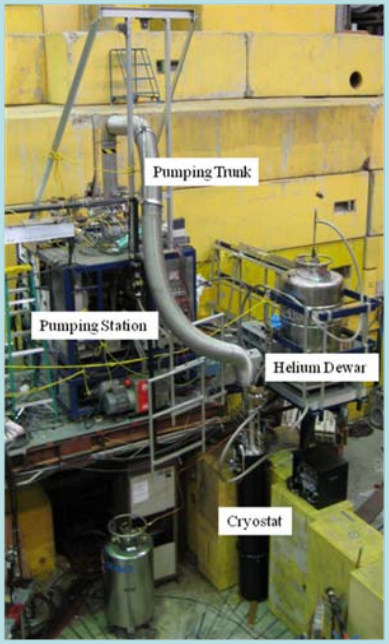


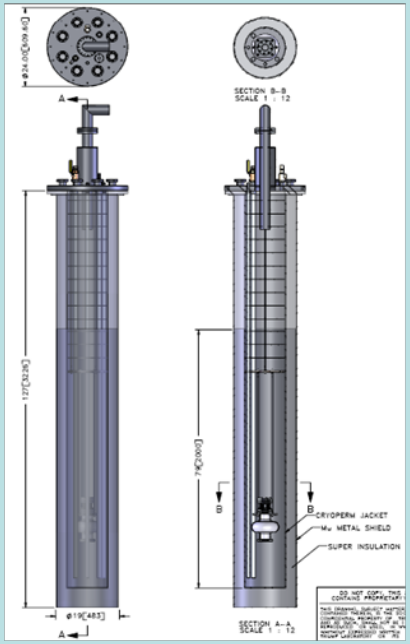
- Injector module base-line design – to be optimized in beam dynamics studies
  - Two single cell cavities; independently powered and phased
  - One multi-cell beta=1 cavity
  - Operating at 1.3GHz and 2K

1.3GHz hardware development: cryostat

- Vacuum vessel and bath insert for single cell test cryostat in hand
- Pumps for 2K tested
- top plate assembly for initial single cell tests complete
- First cold test within a month

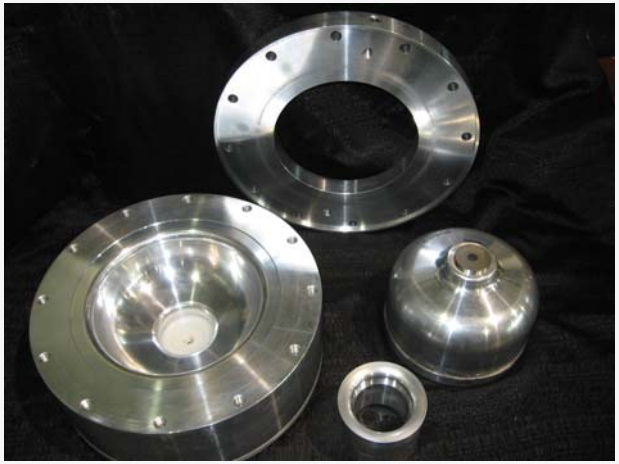
2K Cryostat Test





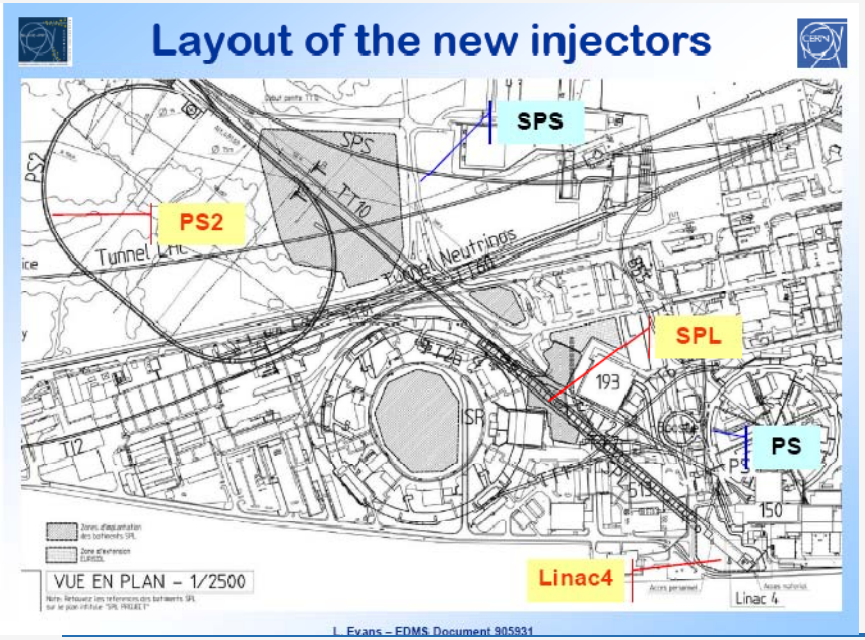
Elliptical Cavity Dev't with PAVAC

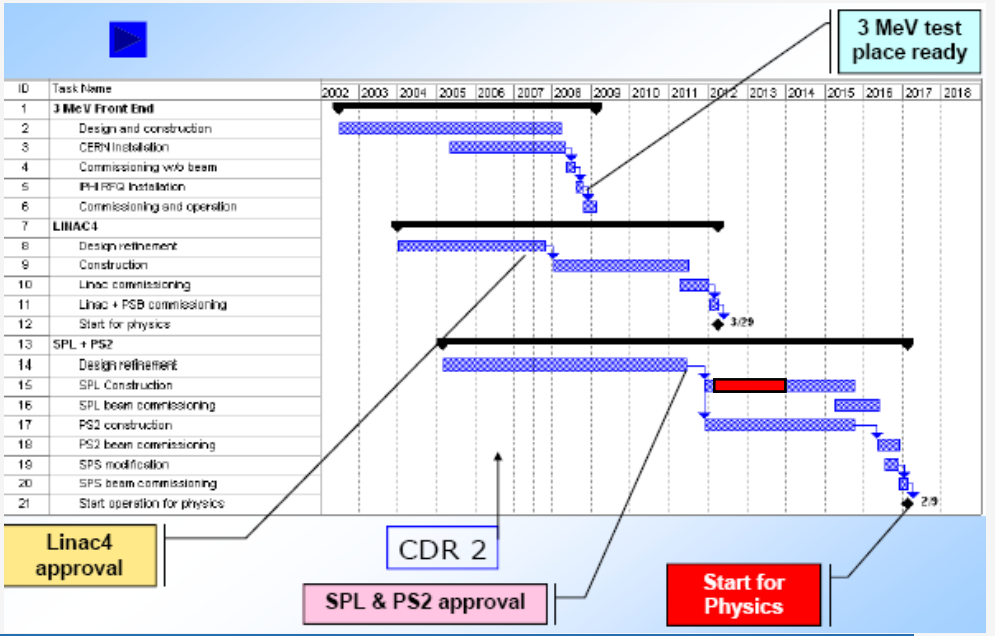
- PAVAC to produce two 1.3GHz single cells by summer 2009
  - Produce and test fixtures, FNAL/RRCAT dies and Nb
  - Forming tests and Welding tests ongoing
  - Cavity production and testing to follow



TRIUMF/CERN Collaborations

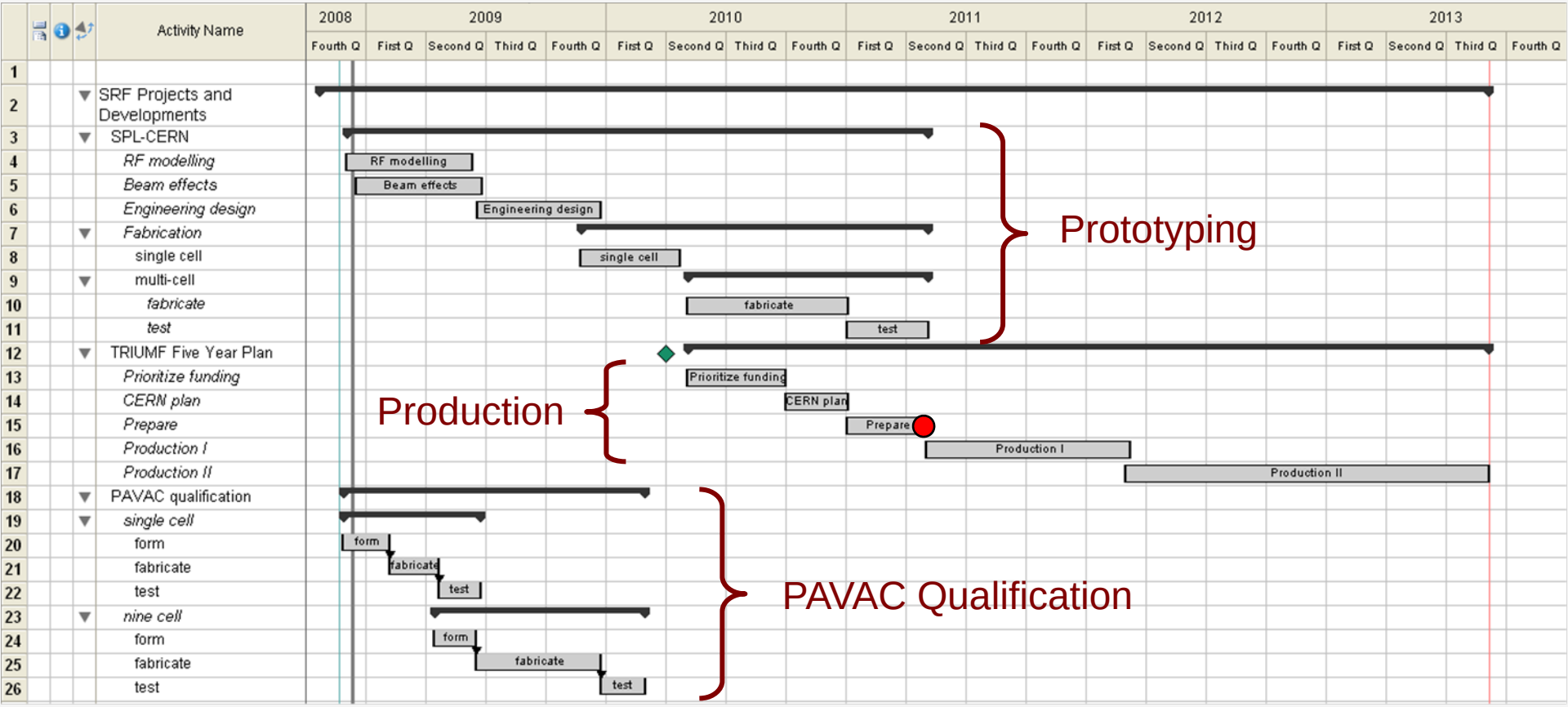
- TRIUMF goals for SPL collaboration
  - Collaborate with IPN Orsay on design and fabrication of a 704MHz beta=0.65 five cell cavity
- Fabricate cavity prototype at PAVAC





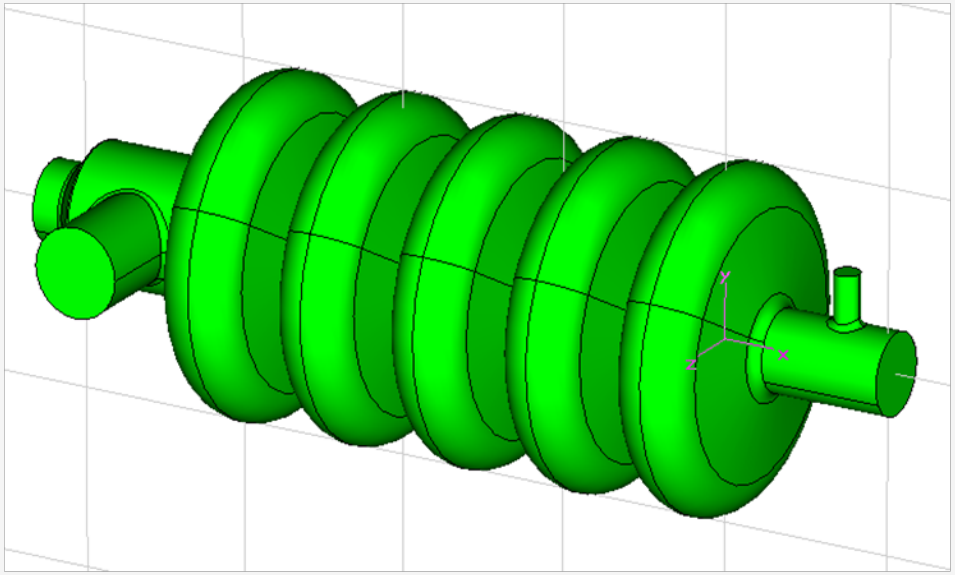
SPL/TRIUMF Schedule

- Hold point in the schedule after the prototyping phase to assess the level of TRIUMF/Canadian commitment to production of hardware

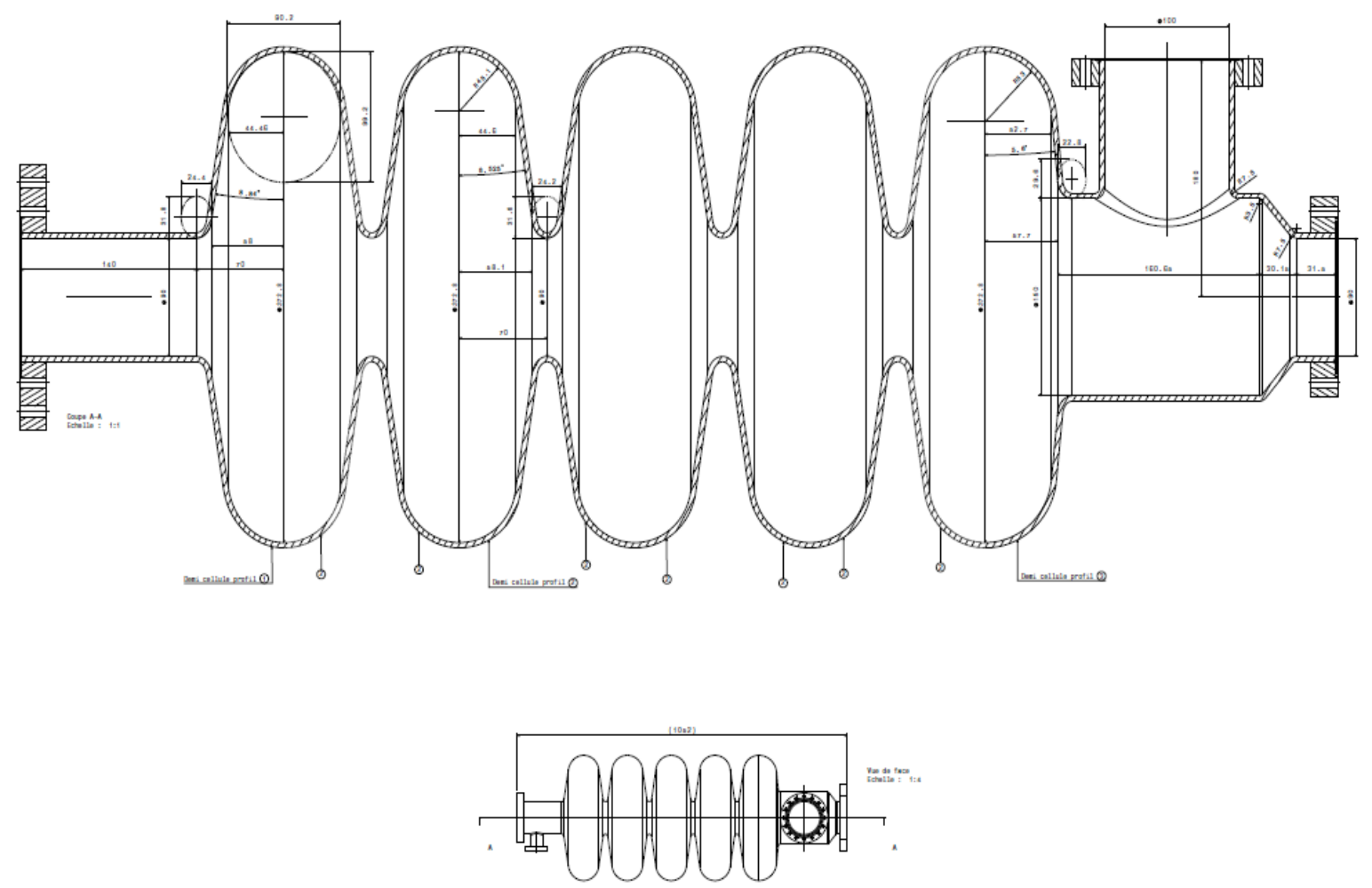


SPL Progress

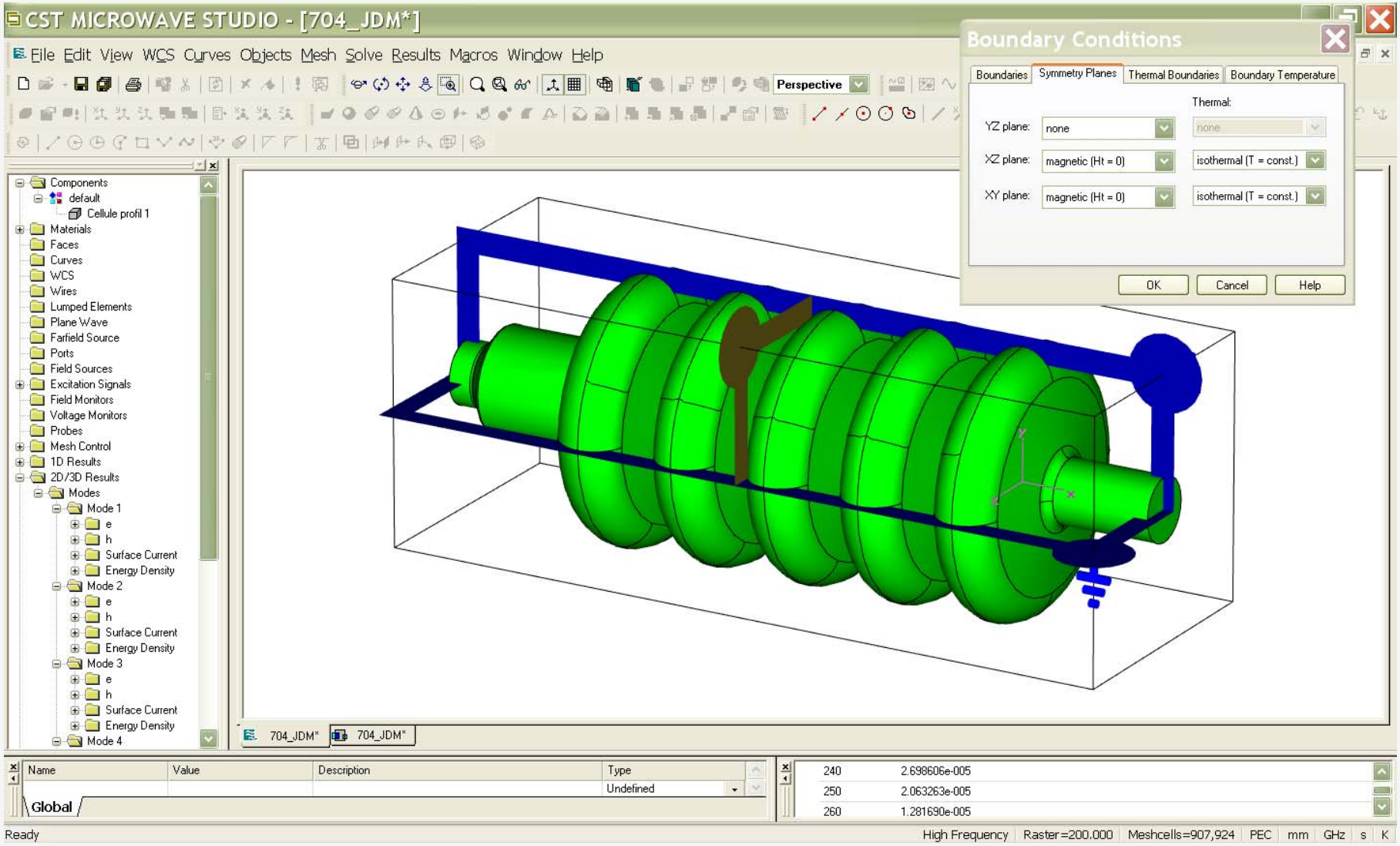
- Progress has been slow
  - Orsay busy on Spiral II
  - TRIUMF busy on ISAC-II
- But … Drawings and 3-D model received from Orsay



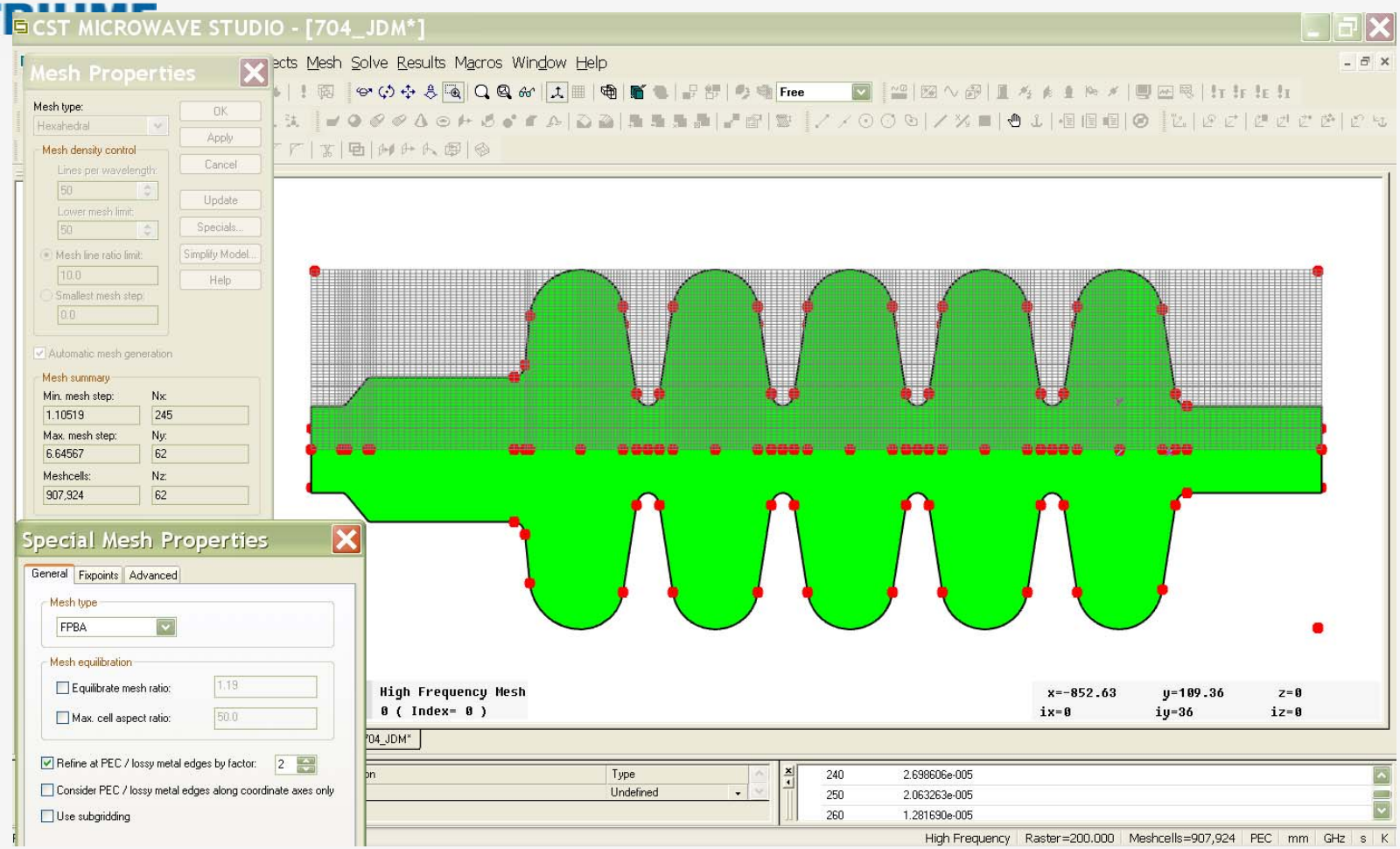
Drawing



•3D Simplified model (without rf ports) was constructed and run simulated with CST Microwave Studio 2008



¼ of the structure modeled



¼ of the structure meshed with ~1,000,000 cells

- ---
- Eigenmode solver settings:
- Method: JDM
- Desired accuracy: 1e-006
- Number of modes: Automatic
- Ignore losses: no
- ---
- Solver Results:
- ---

Mode	Frequency	|(Ax-x)/x|	Accuracy max(e)	Accuracy div(e)
1	0.697801284606	3.62e-007	3.06e-006	3.87e-016
2	0.699943070794	3.10e-007	1.83e-006	4.61e-016
3	0.702515109818	3.08e-007	2.36e-006	2.57e-016
4	0.704409175909	9.17e-007	4.44e-006	3.39e-016
5	0.708715339627	3.81e-007	2.13e-006	4.20e-016

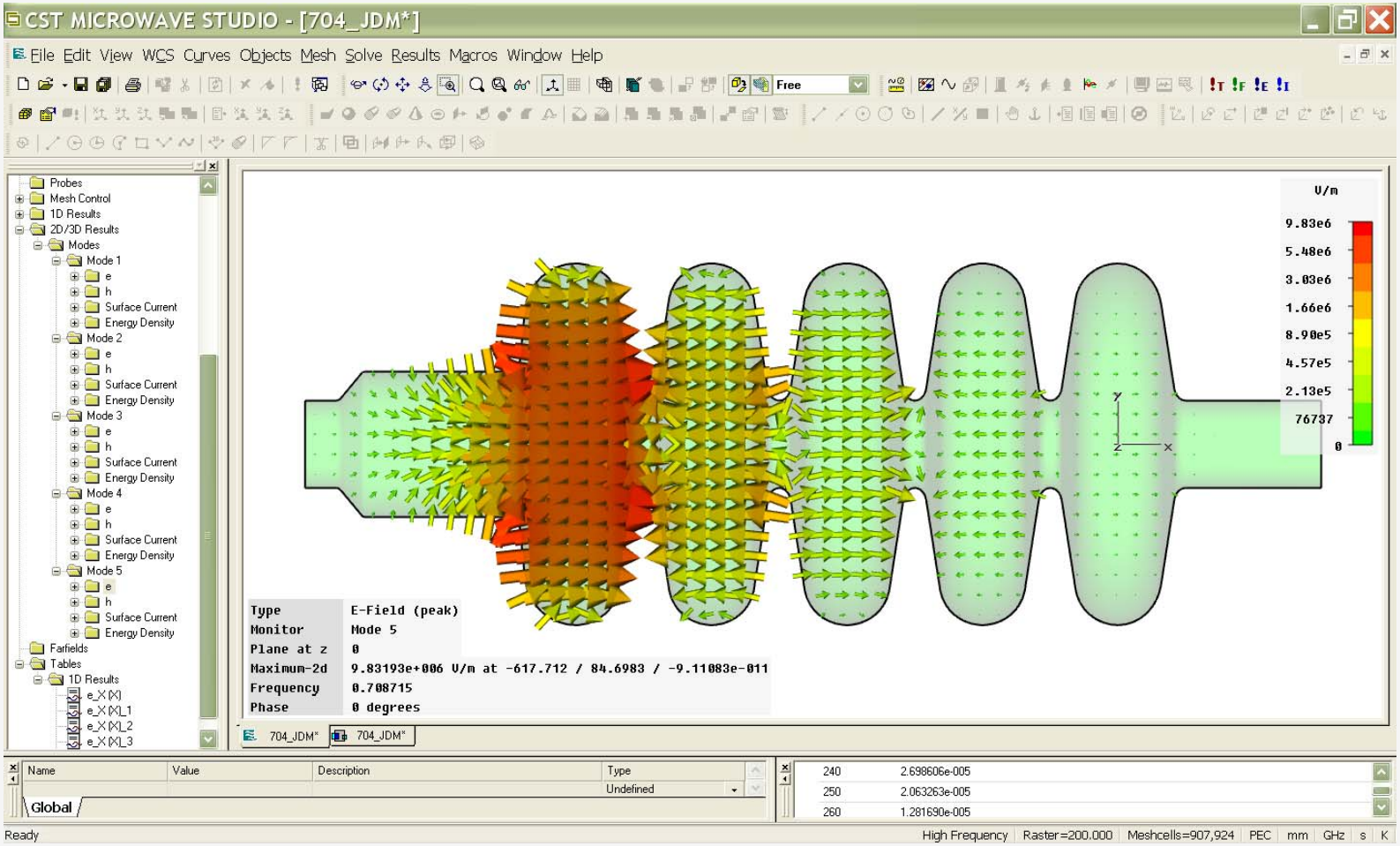
- ---
- ---
- Solver Statistics:
- ---

	Peak memory used (kB) Physical	Peak memory used (kB) Virtual	Free physical memory (kB) At begin	Free physical memory (kB) Minimum
Matrices calc.	197976	327624	2283484	2107556
Solver run total	1229908	1395232	2311672	1307608

- ---
- Mesh generation time : 110 s (= 0 h, 01 m, 50 s)
- Solver time : 27521 s (= 7 h, 38 m, 41 s)
- Total time : 27631 s (= 7 h, 40 m, 31 s)

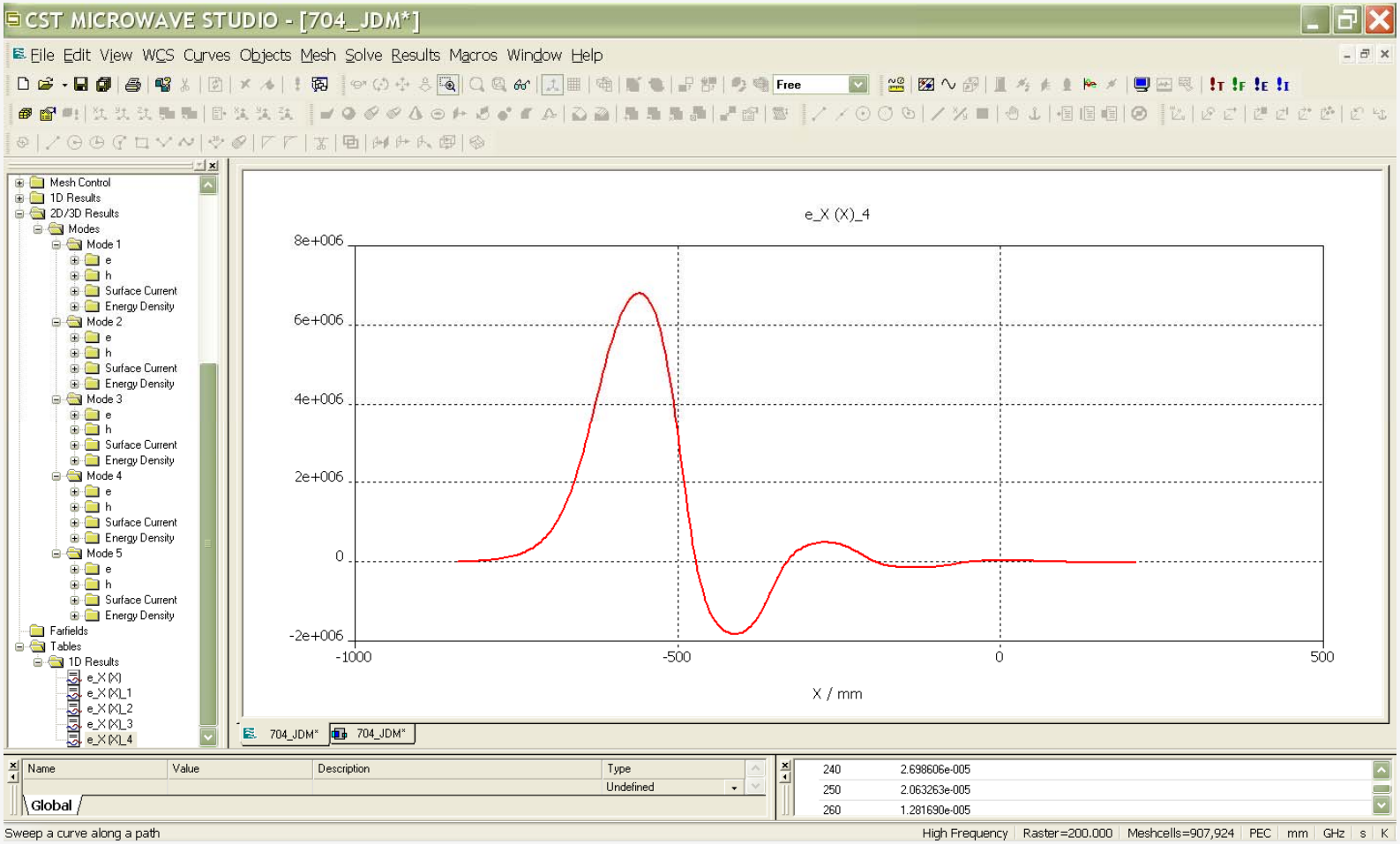
- ¼ of geometry
- TH boundary conditions
- 1,000,000 cells
- 0.5-0.75 GHz range
- After ~8 hours -> 5 modes
- 708.7 MHz pi-mode

PI-mode



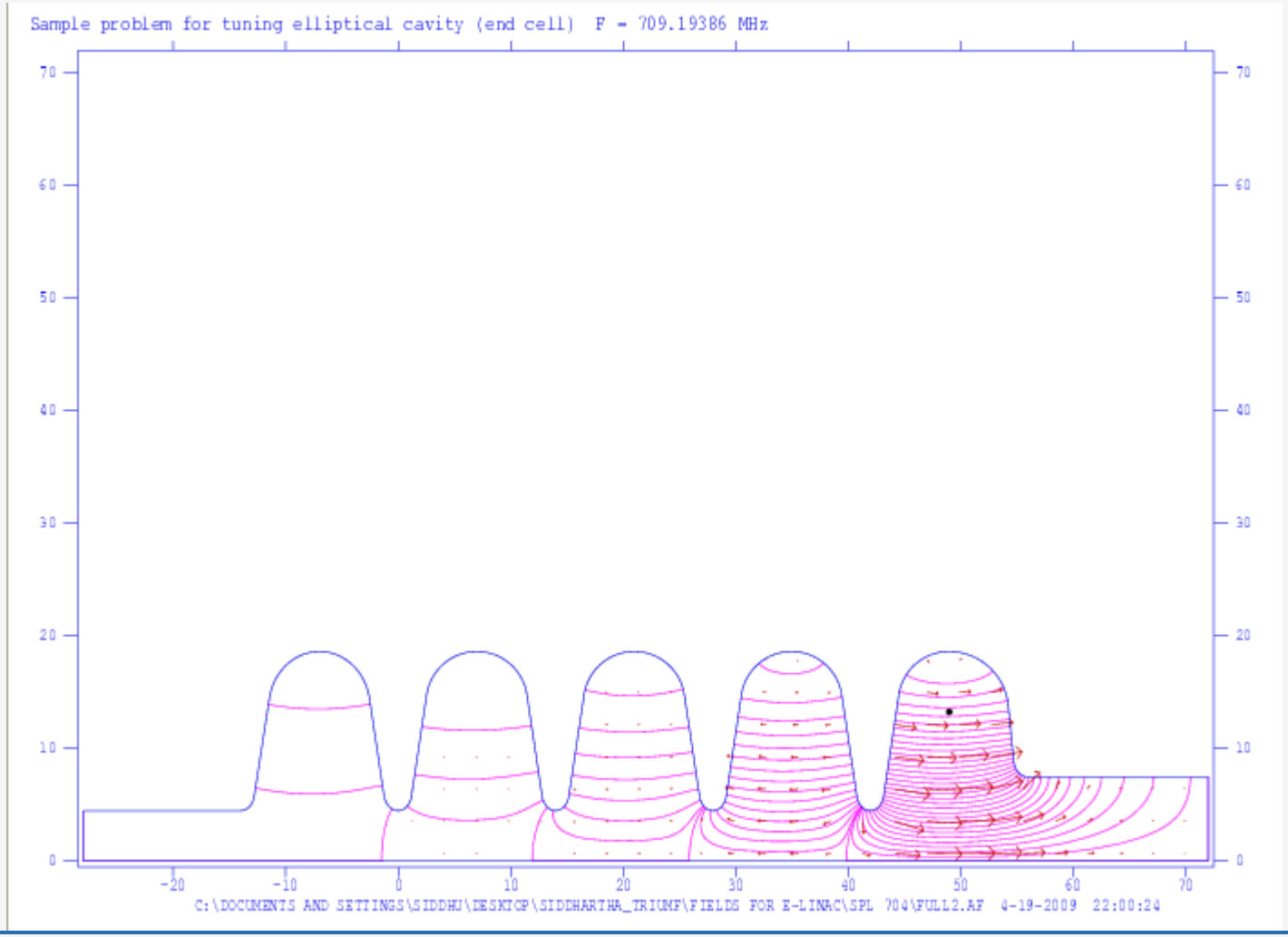
Logarithmic vector map just to define pi-mode; highly non-uniform

3D Simplified Model without RF Ports in Superfish



- Longitudinal accelerating field component

Pi- mode from SUPERFISH 709 MHz



Highly non uniform longitudinal distribution

Next steps: - tune the cavity geometry

- Inner cells
- Outer cells
  - Input coupler end ½ cell
  - HOM end ½ cell
- Full structure
- Coupler and HOM dampers modeling
- Need to define required input and output beam tube geometry