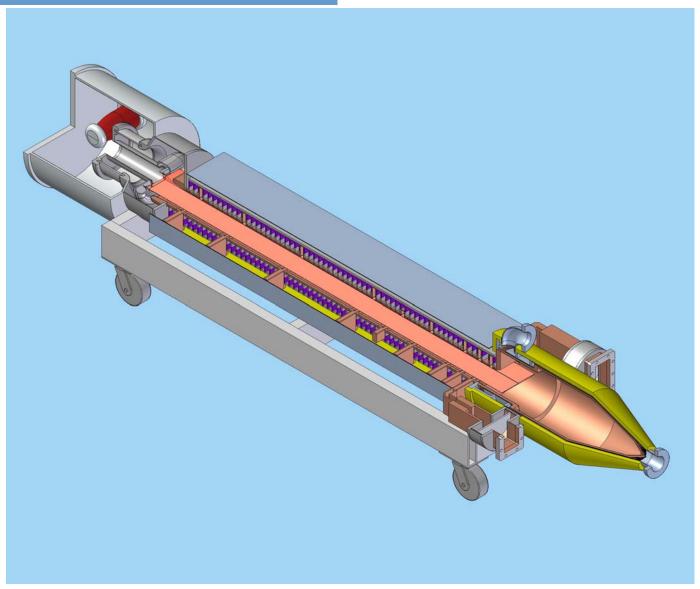
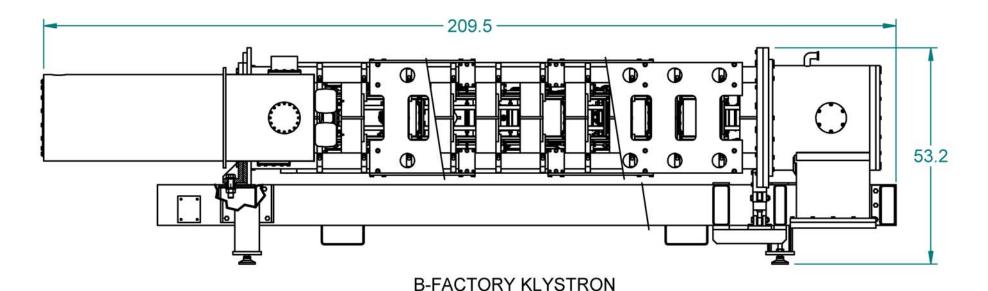
## **ILC SBK Development Status**

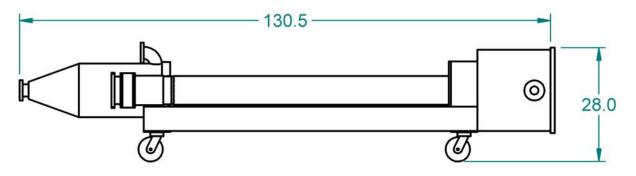
September 27, 2007

#### **ILC SBK Conceptual Design**



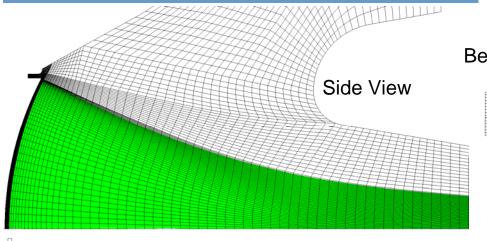
#### **ILC SBK Conceptual Design**

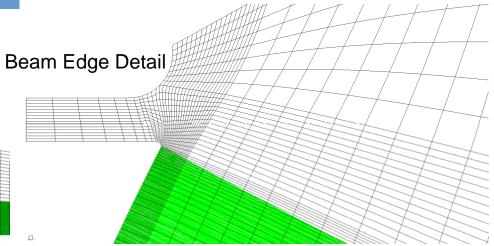


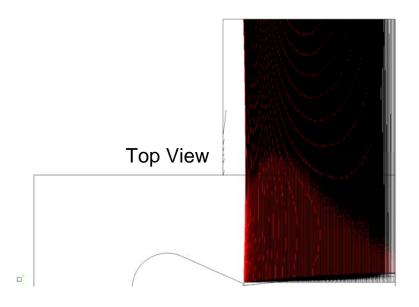


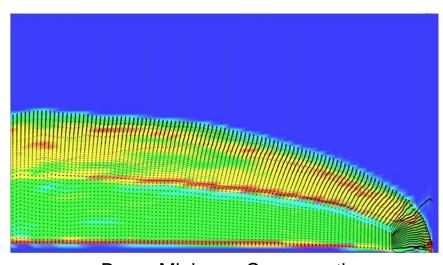
ILC SHEET BEAM KLYSTRON

- 3D design complete, good elliptical beam, slightly hollow for better transport
- Finishing up analysis of FE bias changes and assembly tolerances
- Transport studies focusing on entrance polepiece and edge shaping for beam confinement



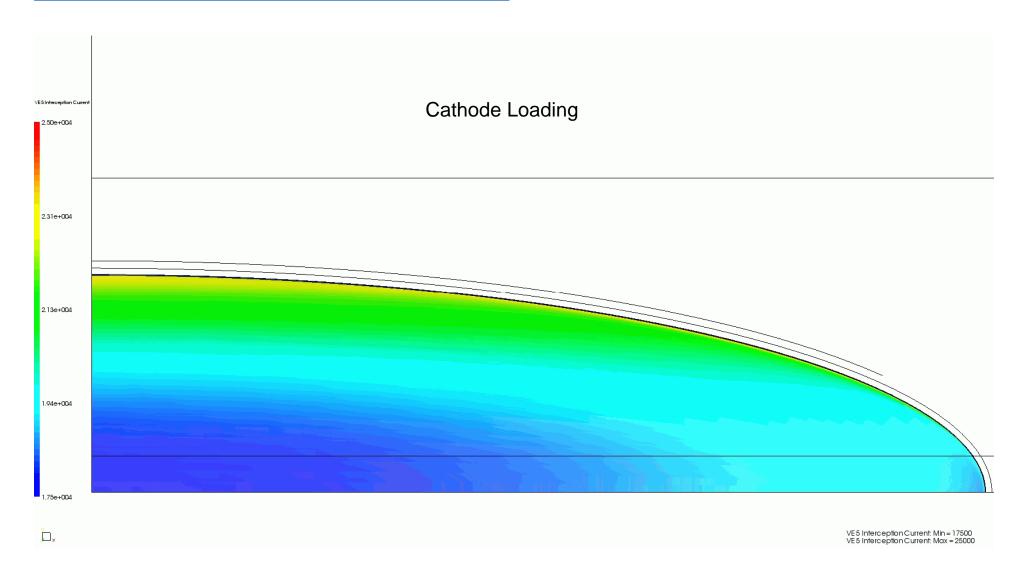




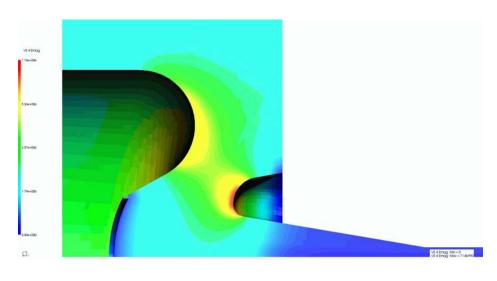


Beam Minimum Cross-section

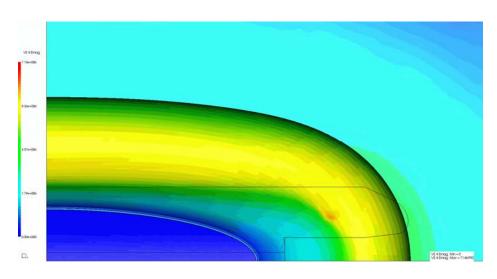


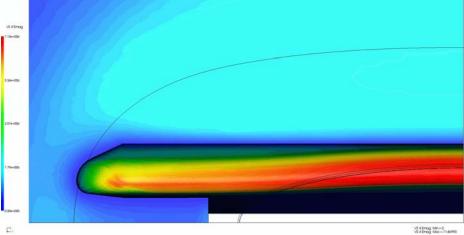




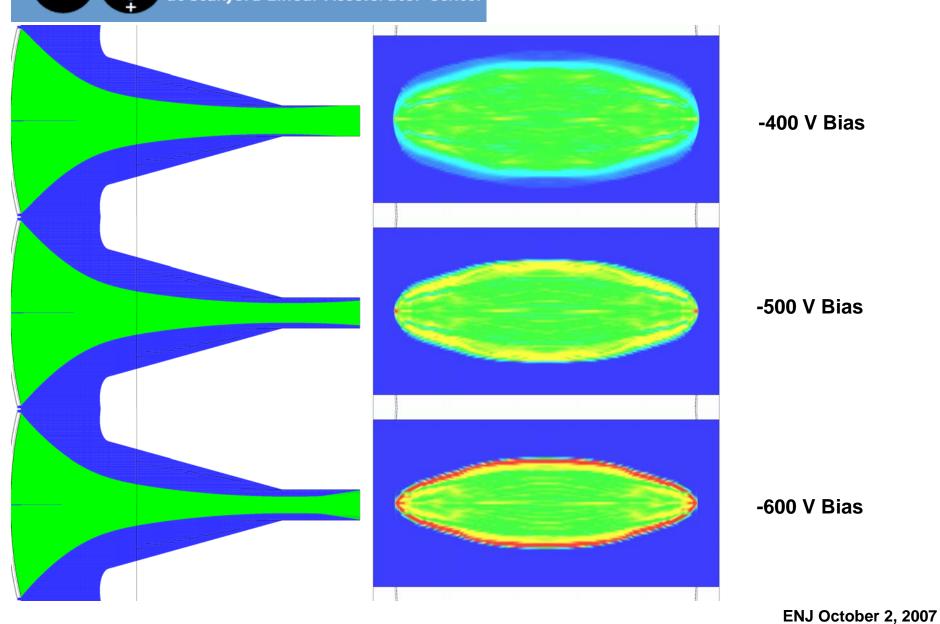


FE Gradients Below 60kV/cm, Anode Below 72 kV/cm

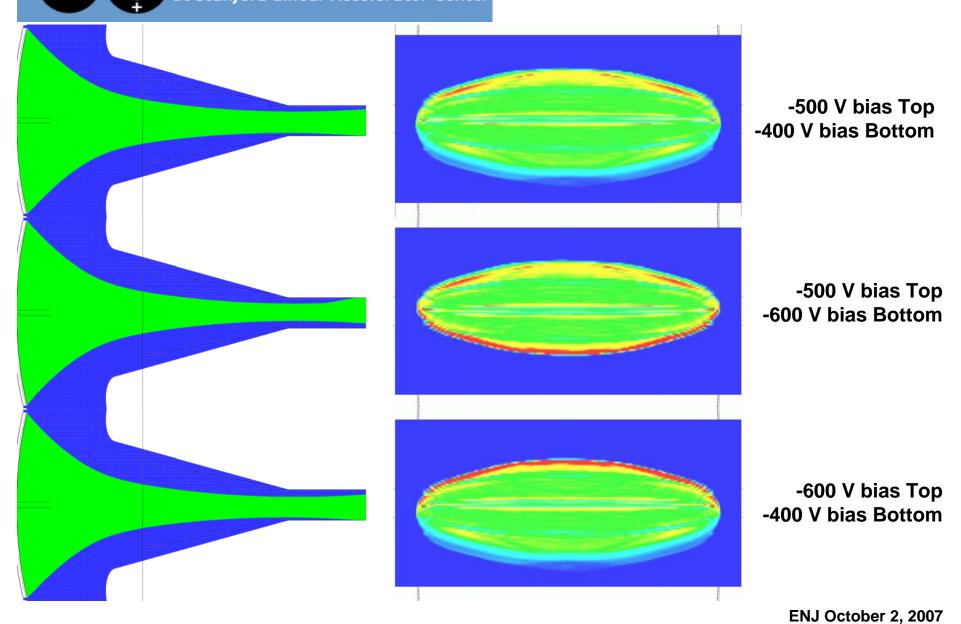




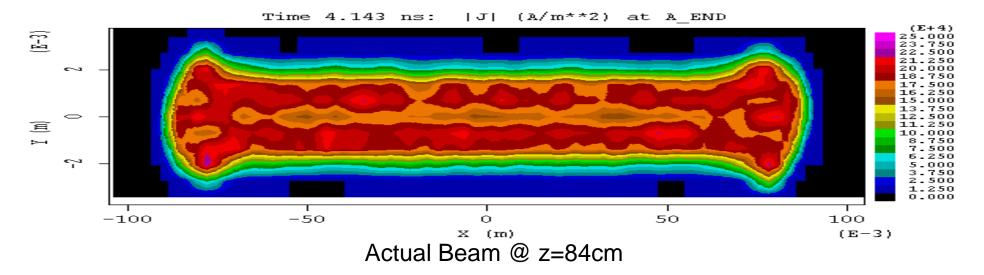


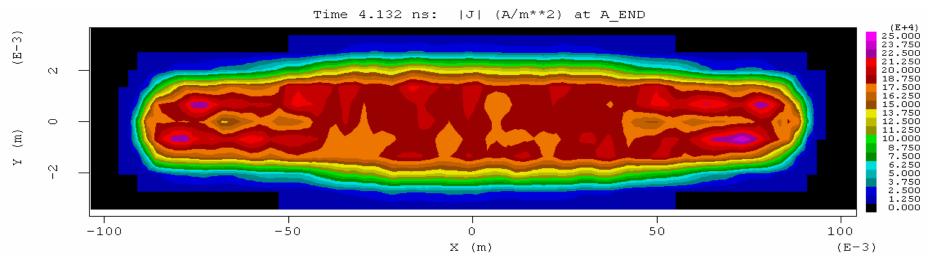




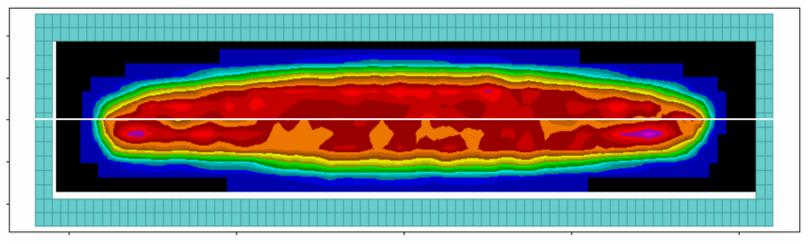


#### **3D Beam Transport**

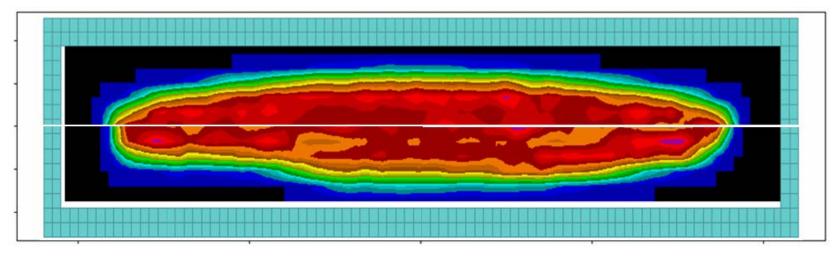




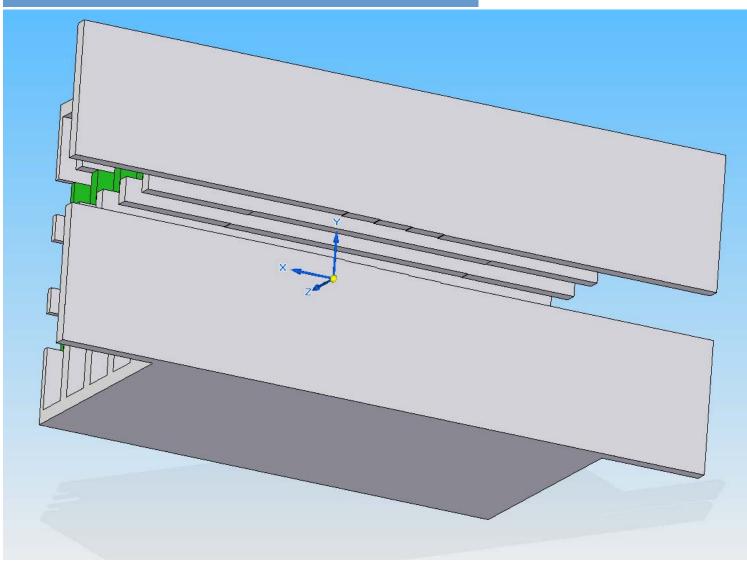
Actual Beam @ z=84cm with Px(z=0) = 0



Actual Beam @ z=14cm (top half) & 84cm (bottom half) with Px(z=0) = 0

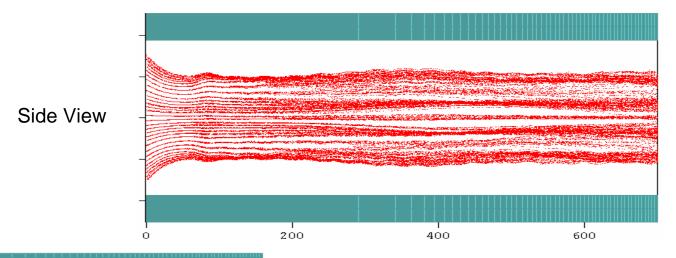


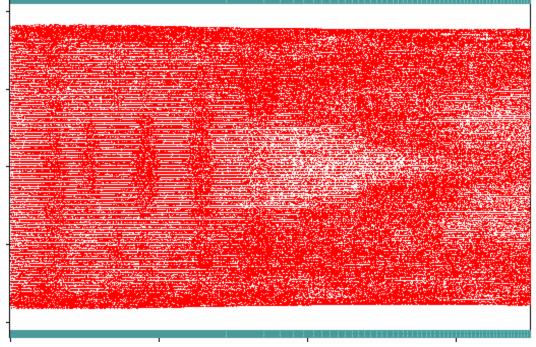
Actual Beam @ z=14cm (top half) & 84cm (bottom half) with Tailored Entrance Pole



Tailored Entrance
Polepiece To
Introduce Initial
Field Tilt

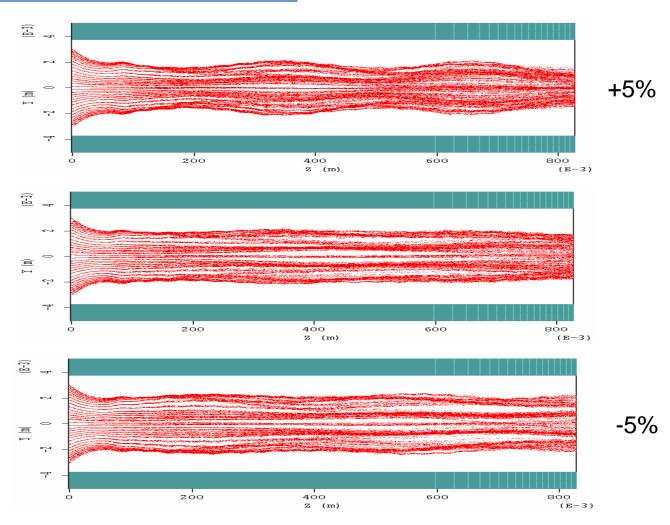
#### **3D Beam Transport**





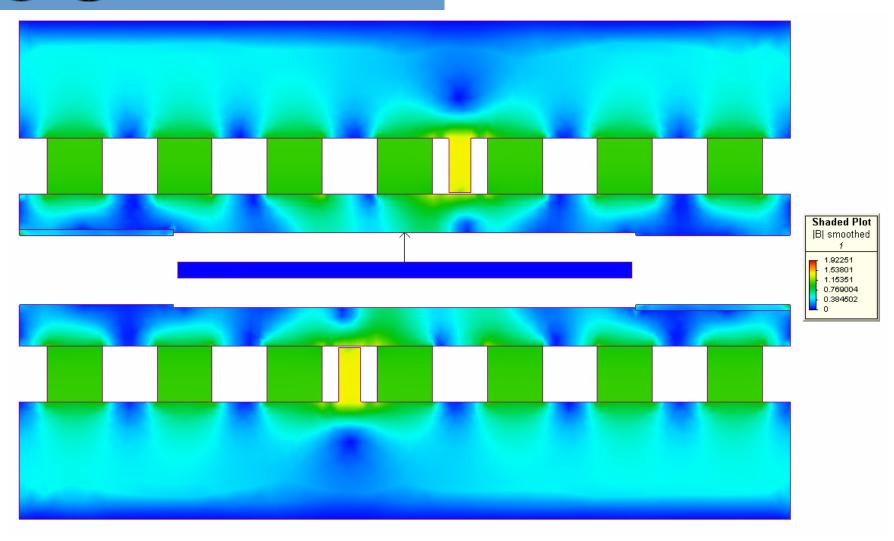
Top View

#### **3D Beam Transport**



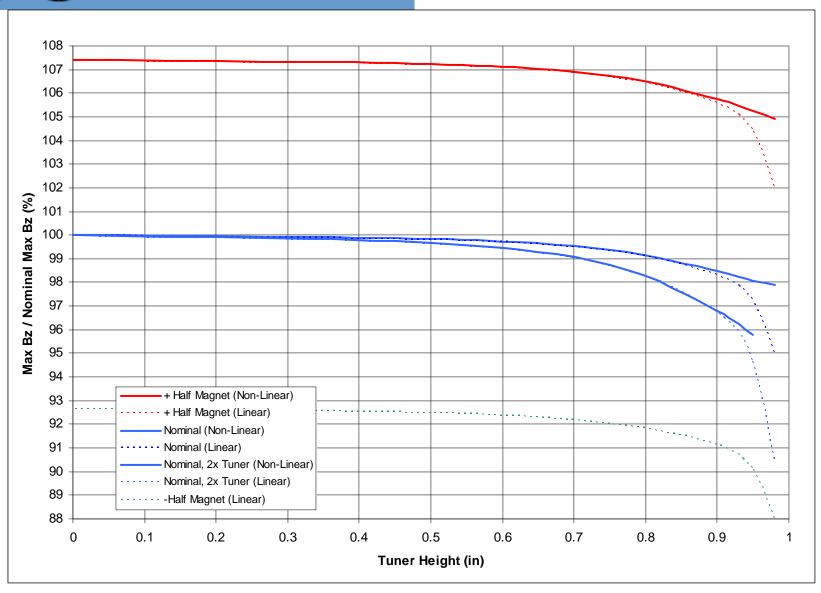
Field Strength Variation

## **3D Magnetics Simulations**

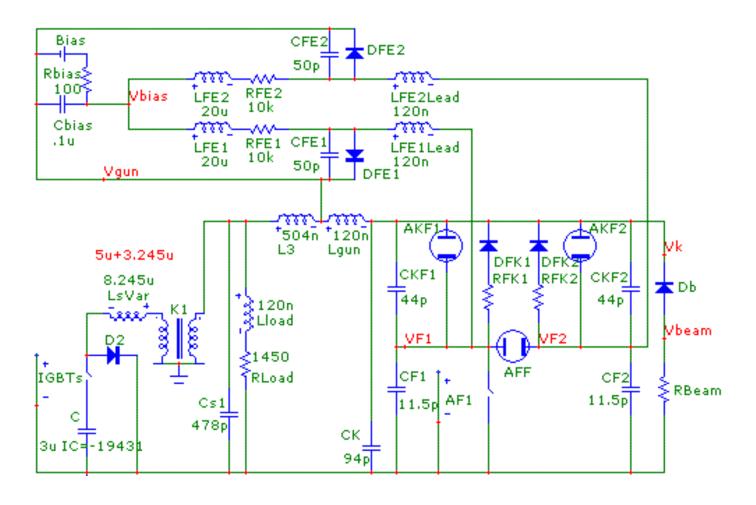


Magnet Trim Stud Simulations

### **3D Magnetics Simulations**

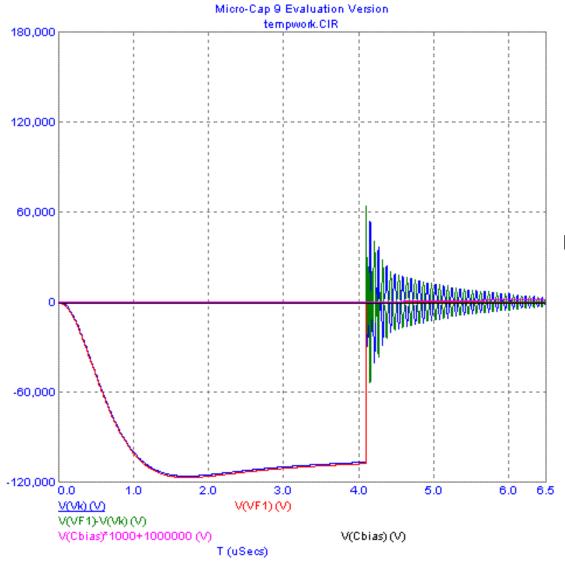


#### **FE Bias Supply Simulations**



Simplified Modulator and FE Bias Supply Schematic

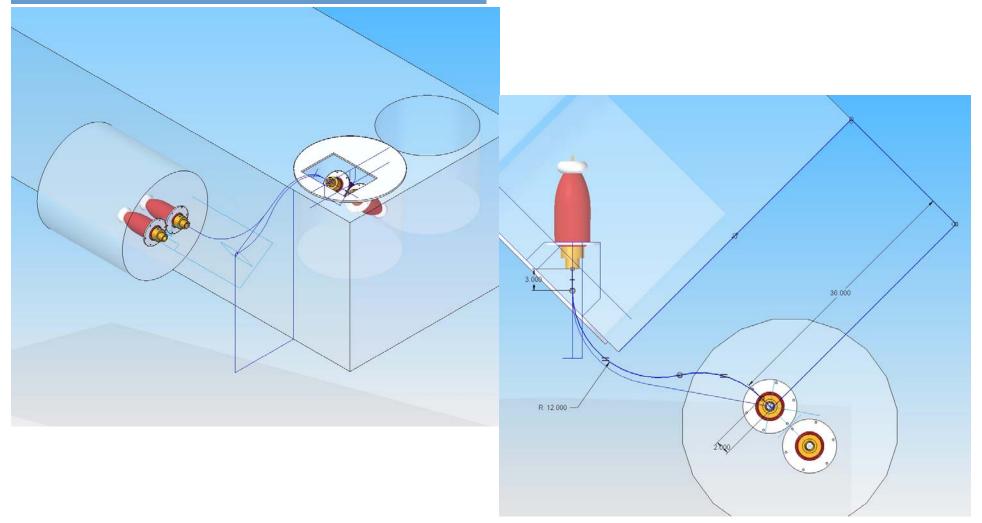
## **FE Bias Supply Simulations**



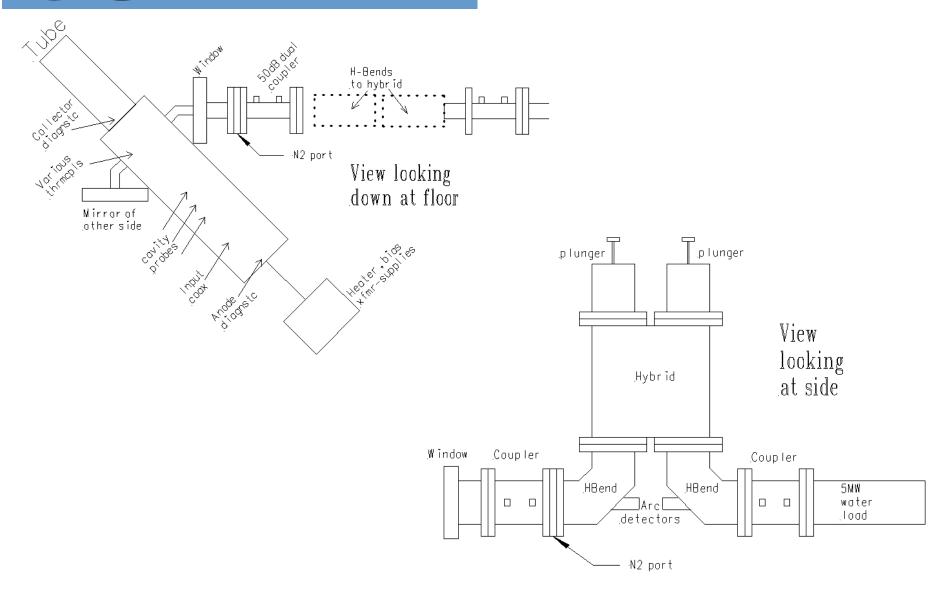
FE to Anode Arc Waveforms



## **DTI Modulator Cable Layout**



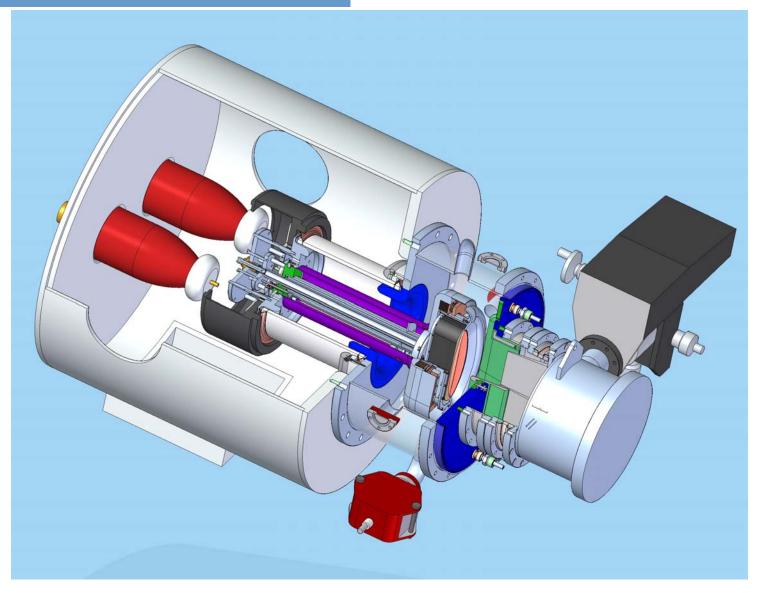
## **Hot Test Waveguide Layout**



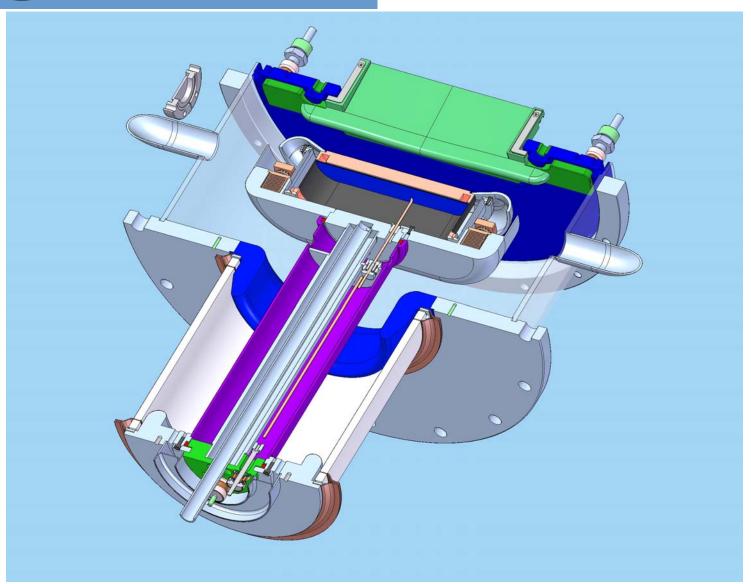
Recap: Beam, RF and Interaction

- Electron gun:
  - Design finalized, geometry to mechanical design
  - Tolerance studies, bias sweeps and HV sweeps
- RF circuit:
  - RF cavity geometry finalized awaiting comparison with cold test.
     Final PPM PIC simulations awaiting magnetics design.
- Window design :
  - Sent to ACD group to verify using SLAC in-house code still looking at ghost modes, multipactor, etc.
- Magnetics design for beam transport:
  - Nearing completion of polepiece shaping for entrance conditions and edge focusing.

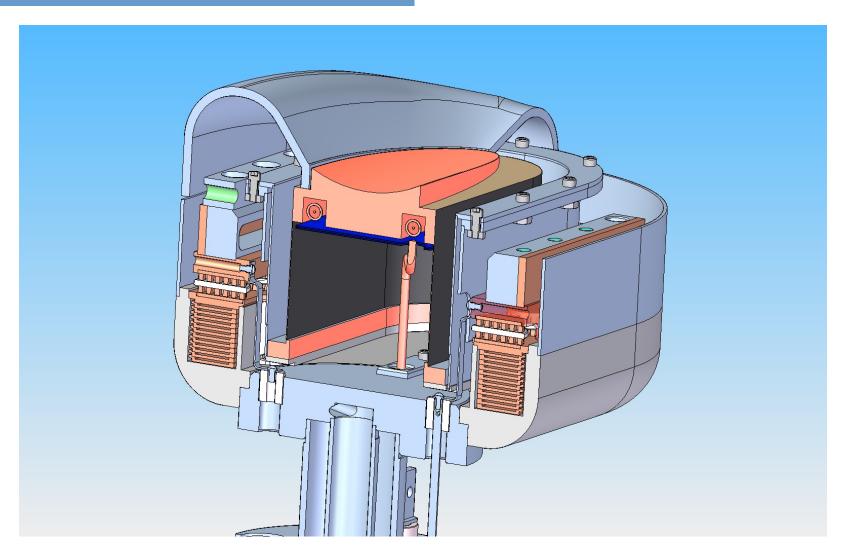
## **Mechanical Design - Diode**



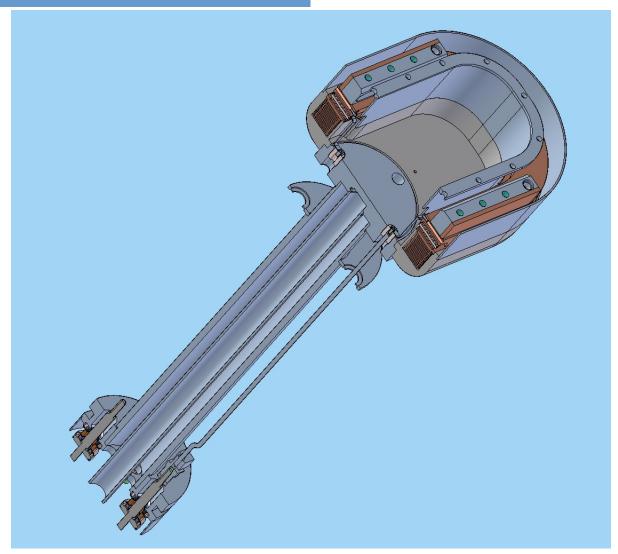
### **Mechanical Design-Gun Assembly**



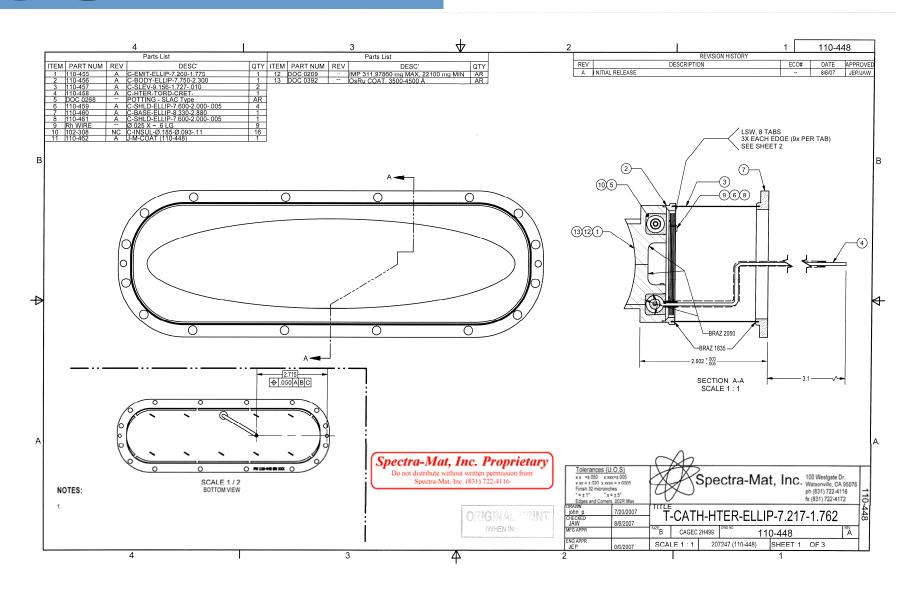
### **Mechanical Design-Electron Gun**



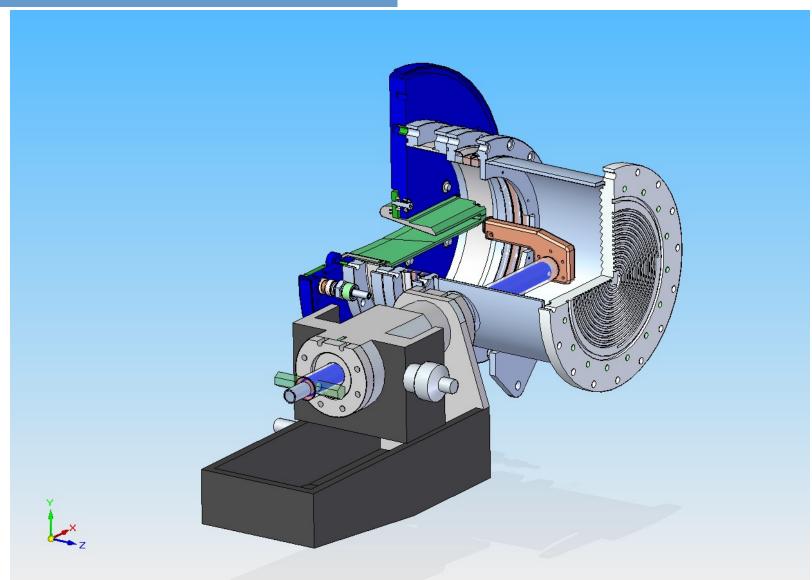
### **Mechanical Design-Electron Gun**



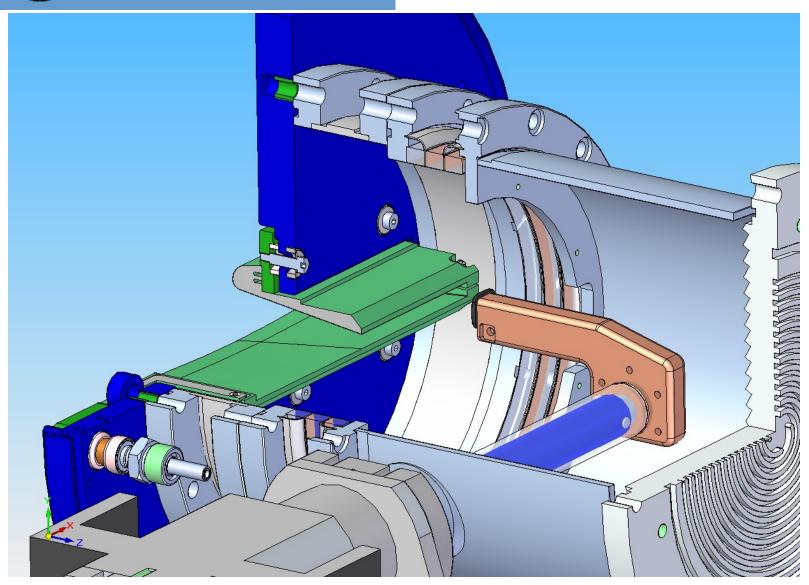
#### **Spectra-Mat Cathode Design**



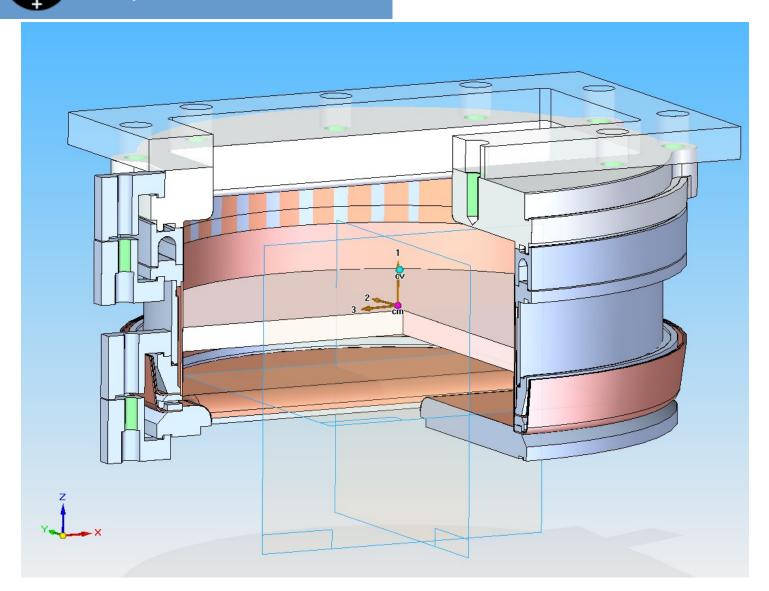
### **Beam Sampling Device Assembly**



### **Beam Sampling Probe Detail**

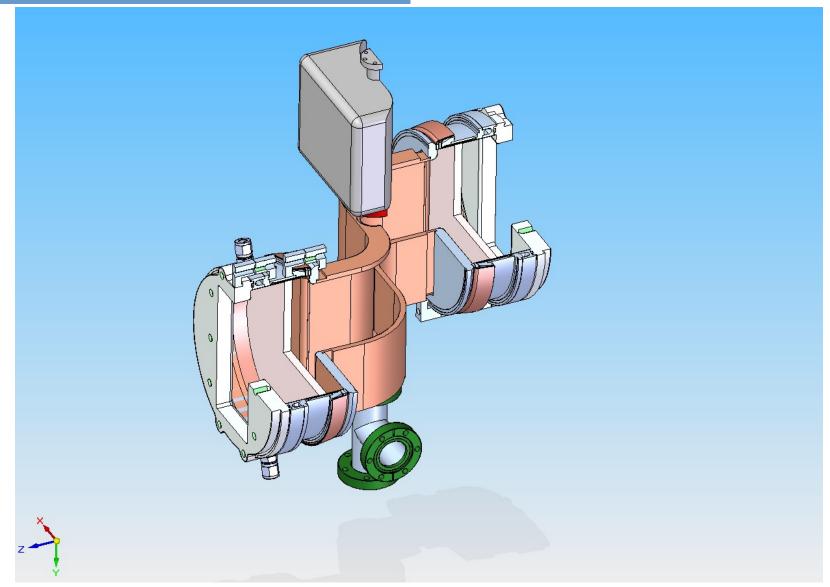


## **Window Assembly**

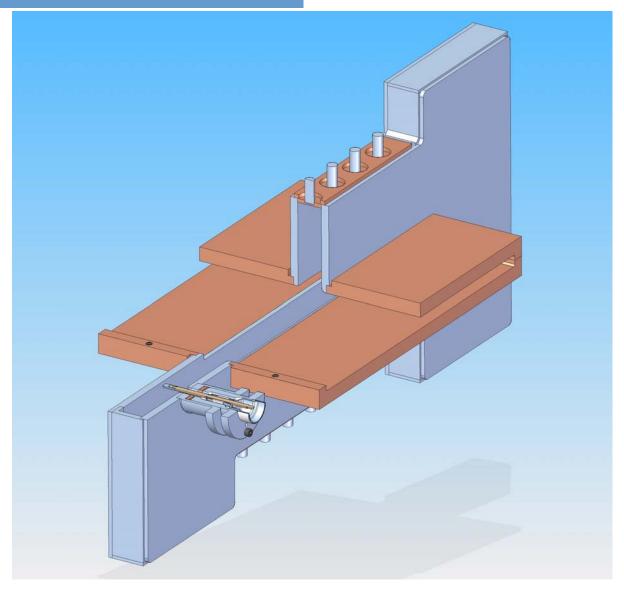


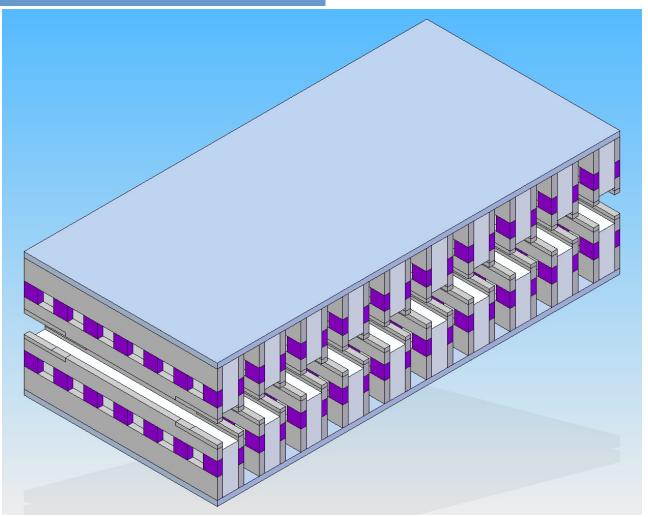


### **Window Hot Test Assembly**

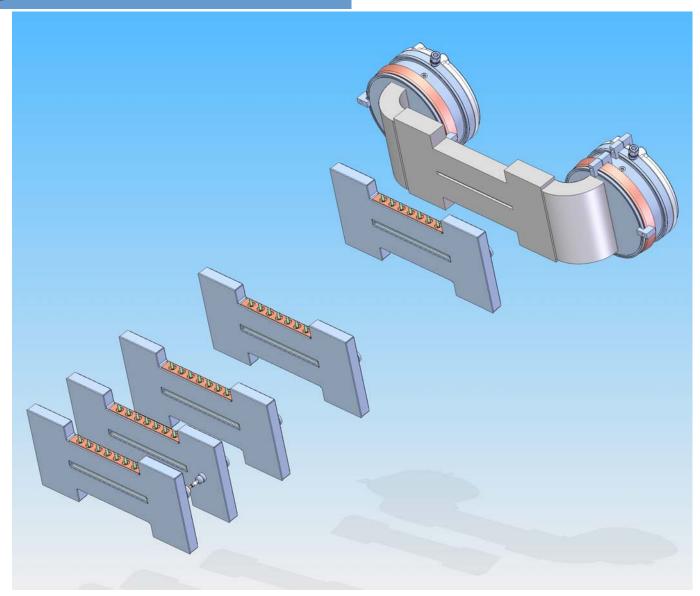


## **Cold Test Cavity Assembly**





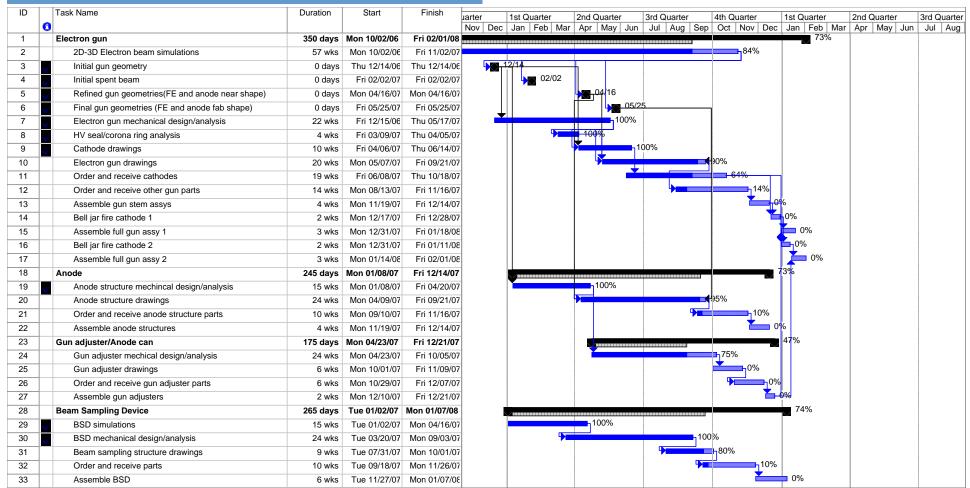
### **Klystron Circuit Layout**



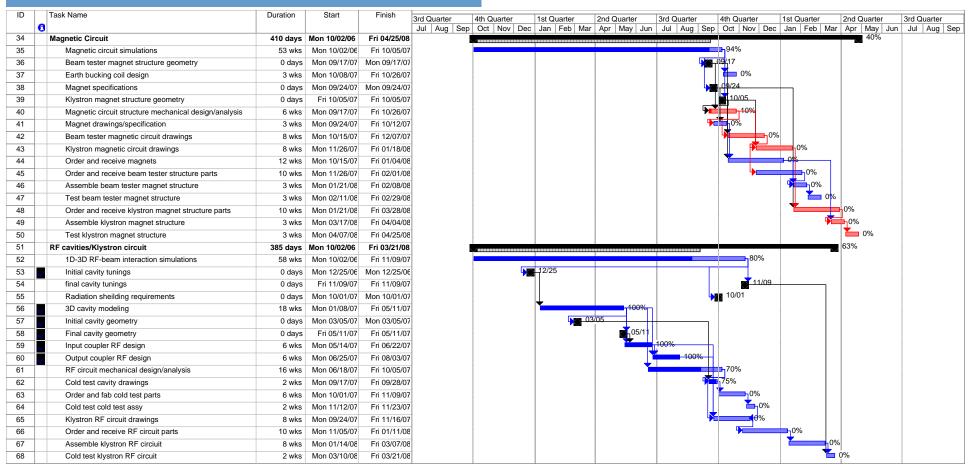
#### Recap: Mechanical Design

- Electron gun:
  - Cathode order has been placed (3 cathodes)
  - Design of stem, FE, cathode support structure finished
  - Drawings in check
- Anode:
  - Split isolated anode design finished
  - Drawings finished, parts on order
- Beam diagnostic:
  - Design finalized
  - Drawings in check, parts on order
- RF cavity/cold test :
  - Design finalized
  - Drawings in check
- Klystron circuit modeling and analysis underway

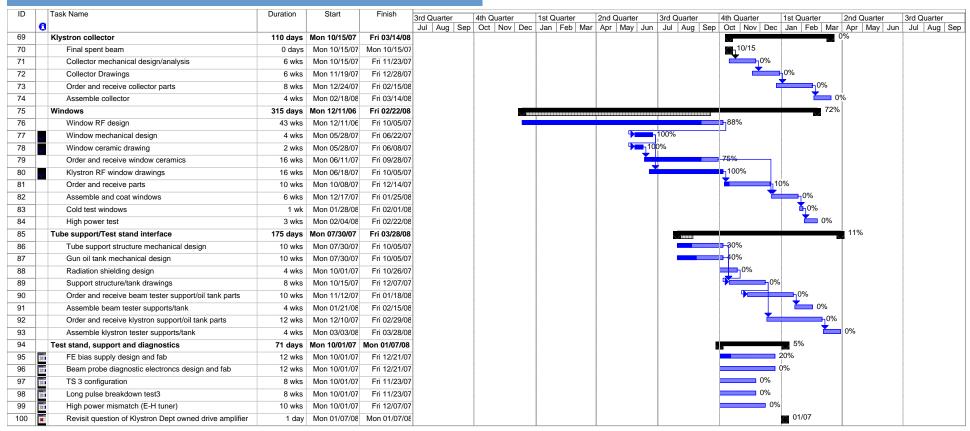
#### **Schedule**



#### **Schedule (continued)**



#### **Schedule (continued)**



## **Schedule (continued)**

ID	Task Name	Duration	Start	Finish	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter
	6					ep Oct Nov Dec		Apr May Jun				Apr May Jun	
101	Assemble and Test Beam Tester	71 days	Mon 01/21/08	Mon 04/28/08								0%	
102	Assemble beam tester	1 wk	Mon 01/21/08	Fri 01/25/08							<u>□</u> 10%		
103	Bake beam tester	3 wks	Mon 01/28/08	Fri 02/15/08							0%		
104	Dress beam tester	1 wk	Mon 02/18/08	Fri 02/22/08							1 0%		
105	Install in TS-3	2 days	Mon 02/25/08	Tue 02/26/08							<u>1</u> 0%		
106	Begin testing beam tester	0 days	Tue 02/26/08	Tue 02/26/08							02/2	26	
107	Test beam tester (electrostatic)	3 wks	Wed 02/27/08	Tue 03/18/08							<b>1</b>	)%	
108	Break vacuum, install drift tube and bake	2 wks	Wed 03/19/08	Tue 04/01/08							<u> </u>	10%	
109	Install magnet structure	2 days	Wed 04/02/08	Thu 04/03/08								10%	
110	Test beam tester (magnetic)	3 wks	Fri 04/04/08	Thu 04/24/08								0%	
111	Remove from TS-3	2 days	Fri 04/25/08	Mon 04/28/08								<u>™ 0%</u>	
112	Assemble and Test Klystron S/N 1	75 days	Mon 03/24/08	Fri 07/04/08									0%
113	Assemble W/G and RF test gear	2 wks	Mon 05/05/08	Fri 05/16/08								0%	
114	Assemble klystron	1 wk	Mon 03/24/08	Fri 03/28/08								0%	
115	Bake klystron	3 wks	Mon 03/31/08	Fri 04/18/08								<u></u> 9%	
116	Dress klystron	3 wks	Mon 04/28/08	Fri 05/16/08								0%	
117	Install in TS-3	1 wk	Mon 05/19/08	Fri 05/23/08								10%	
118	Begin testing klystron S/N 1	0 days	Fri 05/23/08	Fri 05/23/08								05/2	23
119	test klystron	6 wks	Mon 05/26/08	Fri 07/04/08								90000000	<b>—</b> 0%