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F.E.T.S. Beam pipe including drift vessel **Conceptual design** by P. Savage 5th October 2008





Components of LEBT beam pipe and drift vessel





- 1) Outside diameter = 380mm
- 2) Inside diameter = 368mm
- 3) Length = 298mm (face to face)
 - \rightarrow 26mm clearance to solenoid



LEBT drift vessel



Side view





L.E.B.T. beam pipe assembly sequence















Assembly sequence

2) First tank in position









3) Place 1st solenoid support



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4) Add 1st solenoid



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5) Insert 1st beam pipe section



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Faraday cup / beam stop



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Position 1: F.C.T. On beam axis



Position 2: Faraday cup on beam axis



Separate faraday cup and FCT design

Overcomes problems associated with centre to centre distance > 100mm and then heating up of F.C.T. due to proximity of radiating faraday cup



Hand calculations produced a temperature of 720K for the faraday cup – needs further work.

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Faraday Cup

Measurement of the mean beam current on particle accelerators (beam stopper)

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Material:

Cup and shield:	Tantalum
Cup support:	Stainless Steel
Cup insulation:	Ceramics
Cup shape:	Conical
Max. beam power:	600 W (uncooled version) / 6 kW (cooled version)
Connector:	BNC
Max. high voltage:	2500 V
UHV-Feedthrough:	Compressed air actuated Feedthrough



WARWICK

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🖻 Visualisation of potential distributions - JP		
	load	
	rmin 0	
	z min 0	
	r max 65	
	z max 120	
	Pot 1.37746023218136E-03 max	
	Pot min	
	Pixel 1083.333333333333	
	Pixel 2000	
	draw intensity	
	draw aequi pot	
	draw geometry	
	100 %	
Mk III Faraday cup assembly:		
Minimum on axis voltage ~ -546V		
	0%	
	end	





Conclusions:

- LEBT beam pipe and drift vessel design is complete, pending OK from Jim Loughrey. VG Scienta happy with design – VG are investigating most appropriate pneumatic push/pull device.
- Physics design of faraday cup is complete?
- Early thermal hand calcs suggest non-cooled, non-exotic faraday cup should survive.
- Plan to proceed to engineering drawings ASAP, faraday cup design can follow. Aim to complete by end November, allowing one week for quotes, could be in to manufacture before year end.