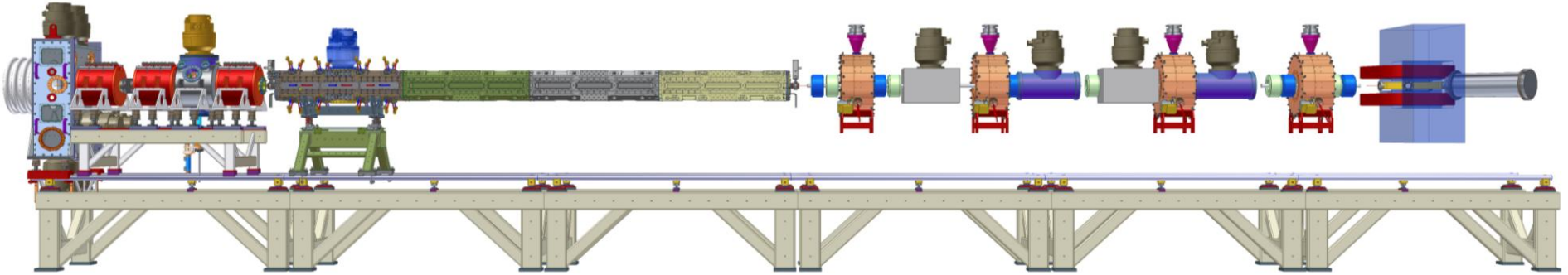
FETS Task List



Work Package	Manager	Description
1	Dan Faircloth (STFC)	Ion source development and beam delivery
2	Juergen Pozimski (IC)	RFQ Commissioning
3	Juergen Pozimski (IC)	Design of a CH-Linac
4	Replacement Jolly (IC)	MEBT
5	Christoph Gabor (STFC)	Diagnostics
6	Alan Letchford (STFC)	Future of FETS

Tasks		Who?	Comment
1.00	**General**		
1.01	MEBT optics design	Morteza	Morteza to take over from Chip. Need optics simulation using simulated RFQ beam. Input from Simon's RFQ work.
1.02	MEBT beam dynamics	Morteza, Simon, (Chip)	Matching beam from RFQ to MEBT. Rotation of chopping plane. Extending existing GPT simulations.
1.03	Support structures	Pete, Alberto	
1.04	Component datums	Pete, Alberto	Consult with Dave Wilsher at design stage

1.05	Component alignment	Jim Loughrey, Adrian	Consult with at design stage - Adrian to revisit FETS datums prior to RFQ instasllation
1.06	Cooling	Duncan Couchman	Design of RFQ cooling underway, Scott experienced with CFD.
1.07	Power	Mike Perkins?	Need electrical services contact
1.08	Link to OM	Alberto	Peter Clarke, Richard Day etc.
1.09	MEBT beam pipe	Pete, Alberto	Designed around KF40? - TBC
1.10	MEBT beam scrapers	Pete, Alberto	Protect chopper plates by scraping off beam halo using water cooled scrapers.
1.11	Overview CAD model	Pete, Alberto	One model, probably to be held by Pete
1.12	LEBT spectrometer	Juergen, Pete, Saad	Initial tests look positive
1.13	CH studies	Juergen, Morteza, Pete	Modelling in COMSOL - next step is end flange design
1.14	Mag field measurement facility	Juergen, Saad, Pete	Hall probe bought. Saad to look at control for linear stages.
1.15	Personnel	N/A	Who is part of the team?
2.00	**Project Engineering**		
2.01	Function	N/A	To get the MEBT built on time and to within budget
2.02	First steps	N/A	Assigining tasks to the right people and checking on progress.
2.03	Time	Pete, Alberto	
2.04	Budget	Alan, Juergen, Pete	
3.00	**Ion source**		
3.01	Plans?	Dan, Scott	
4.00	**RFQ Ancilliaries**		
4.01	Tuners	Pete	Built, need vacuum brazing
4.02	Baffles - design	Pete	Concept design complete. To be checked with Duncan for Reynold's number.
4.03	Baffles - manufacture	Ian Clark	
4.04	End flanges - design	Pete	Concept design complete. Needs to be approved by FETS team.
4.05	RFQ RF test end flange - modelling	Morteza, Pete, Saad	Simulations underway. Converging on solution.
4.06	RFQ RF test end flange - design	Pete	
4.07	RFQ RF test end flange - manufacture	Ian Clark	
4.08	Mid flanges - design	Pete	Concept designs complete. Flat Viton rings need to be detailed and ordered.
4.09	Mid flanges - manufacture	Ian Clark	
4.10	3D O ring bonding jig - design	Pete	Copy of design used for testing
4.11	3D O ring bonding jig - manufacture	Ian Clark	

4.12	Assembly jig -design	Alberto	Complete
4.13	Assembly jig - manufacture	Outisde manufacturer	Being manufactured. Dowels etc on order.
5.00	**Shielding**		
5.01	Function	N/A	To protect us from radiation
5.02	Description	N/A	Large concrete blocks arranged to enclose RFQ and MEBT
5.03	Calculations	Alan, Juergen	
5.04	Risk assessment	Alan, Dan, Juergen	Dan is radiation safety officer for R8
5.05	Interlocks	Alan, Mike Perkins	
5.06	Purchasing	Alan	
5.07	Installation	John Govans, Phil	Take advice from installers and existing experience from ISIS
6.00	**RF System**		
6.01	Function	N/A	To transport RF power from the Klystron to the RFQ and MEBT
6.02	Description	N/A	Waveguide (Mega Industries W2300) followed by coaxial cable
6.03	Purchasing	Saad, Alan	
6.04	Design	Saad, Pete	Preliminary layouts have been made.
6.05	Waveguide installation	John Govans	Circulator arrived, waveguide on the way.
6.06	Waveguide support structure	Alberto knows contact	MiniTec framework - make it up as you go.
6.07	Waveguide testing	Saad	
6.08	Coax specification	Saad	
6.09	Coax installation	John Govans	
6.10	Commissioning	Saad	
6.11	Klystron dummy load plumbing	Duncan Couchman	Duncan aware that new pump, flow switch and associated pipework need to be fitted
7.00	**RF Couplers**	**ESSB**	
7.01	Function	N/A	To introduce RF power into accelerating structures
7.02	Description	N/A	Tapered coax line terminating in water cooled loop
7.03	Quantity	N/A	Six (2 RFQ + 4 MEBT) + 2 etxra for RFQ if power density is too high
7.04	RF / EM Simulations	Juanlu	
7.05	Engineering design	ESSB, Alberto	
7.06	Prototype manufacture	ESSB	

7.07	Testing	FETS team	Someone with a Klystron! What do we test into? RFQ cold model?
7.08	Manufacture	ESSB	
7.09	Cooling	Duncan Couchman	Only cooled in region of loop.
8.00	**Chopper**		
8.01	Function	N/A	To create precise gaps in the beam
8.02	Description	N/A	Series of electrodes within vacuum vessel
8.03	Length	N/A	~450mm
8.04	Beam pipe diameter	N/A	20mm in X
8.05	EM design	Mike Clarke-Gaythe	
8.06	Optics design	Mike Clarke-Gaythe	How does this interface with wider MEBT optics design?
8.07	Electrode design	Mike Clarke-Gaythe	Helical prototype, planar prototype
8.08	Engineering design	RAL Engineer	Mike to advise on how much engineering support to be provided.
8.09	Manufacturing	External co.	Mike to advise.
8.10	Testing		Mike to advise.
8.11	Commissioning		Mike to advise.
8.12	Electrical requirements		Pulse generators, low level controls, cabling
8.13	Vacuum	FETS team member	Mount for vacuum pump
8.14	Support structure	Pete, Alberto	
8.15	Alignment tolerances	Mike Clarke-Gaythe	Mike to advise on sensitivity to alignment.
9.00	**Chopper beam dumps**		**2 required - see CERN and SNS designs**
9.01	Function	N/A	Place where chopped beam is dumped into.
9.02	Description	N/A	Vacuum vessel with moveable water cooled target and mount for vacuum pump.
9.03	Length	N/A	~ 450mm
9.04	How many bunches?	N/A	Fast chopper removes two sets of three adjacent bunches. Slow chopper removes central set.
9.05	Chopping orientation	N/A	Vertical - unidirectional for both choppers?
9.06	Material	N/A	Dump requires good thermal conduction + low radiation = aluminium (pure). Coating to prevent sputtering?
9.07	Specification	Mike Clarke-Gaythe	Lengths, angles from chopper
9.08	Thermal simulation	Scott, Dan	
9.09	Engineering design	Alberto, Pete	
9.10	Manufacture	RAL, HEP workshop	
9.11	Support structure design	Pete, Alberto	

9.12	Support structure manufacture	External co.	
9.13	Cooling	Duncan Couchman	Not much required.
9.14	Vacuum	FETS team member	Pump at this higher pressure location.
10.00	**Rebuncher Cavities**		**4 required, designed and built in partnership with whom?**
10.01	Function	N/A	To bunch the beam (by slowing particles at the head of the bunch and speeding up particles at the back of the bunch).
10.02	Description	N/A	Water cooled copper cylinders with re-entrant noses.
10.03	Length	N/A	~200mm
10.04	EM design	Previously Chip	Need to know who are our partners soon - ESSL? ESSB? Both?
10.05	Frequency / tolerance studies	Saad, Morteza	
10.06	Thermal simulations	Scott	
10.07	Tuning system design	Saad	
10.08	Cold model design	Engineer	Why do we want one?
10.09	Cold model testing		LLRF? Bead pull?
10.10	Engineering design	Engineer	
10.11	Support structure design	Pete, Alberto	
10.12	Support structure manufacture	External co.	
10.13	Manufacture		
10.14	Testing / commissioning		
10.15	Cooling	Duncan Couchman	
11.00	**Quadrupoles**		**Eleven required, common design, designed and built in partnership with ESSB and/or ESSL**
11.01	Function	N/A	To focus or de-focus beam (and steer?)
11.02	Description	N/A	Water cooled (possibly) quadrupole
11.03	Length	N/A	~70mm
11.04	EM design	John Back, Dan	
11.05	Novel or standard design?	Previously Chip	Need approach manufacturers ASAP
11.06	Specification	Alberto	Magnetic field strength, bore, Z length
11.07	Power supply	?	Possibility to control pairs of poles at extra cost.
11.08	Cooling	Duncan Couchman	If standard design is chosen
11.09	Magnetic field map check	Daresbury, Imperial	Imperial may have system in place by then.
11.10	Manufacture	External co.	Alberto finding out who exisiting manufacturers are.

12.00	**Beam Position Monitors**		
12.01	Function	N/A	There's a clue in the name.
12.02	Description	N/A	Short flanged vacuum tube . Should sit in available gaps. Most informative after chopper.
12.03	Design	Simon, UCL	
12.04	Readout	Simon, UCL	
12.05	Manufacture	UCL, OM	
13.00	**Fixed diagnostics**		
13.01	Function	N/A	To inspect beam at the end of the MEBT.
13.02	Description	N/A	Vacuum vessel sitting inbetween large dipole (to deflect beam) with with laser system to separate beam.
13.03	2D vessel design	Christoph	Initial investigations underway.
13.04	3D vessel design	Pete, Alberto, Christoph	
13.05	Magnet design	External co, John Back	Approach companies this summer.
13.06	Magnet manufacture	External co.	Christoph in talks with whom?
13.07	Magnet field map check	Daresbury, Imperial	Imperial may have system in place by then.
13.08	Magnet support design	Pete, Alberto	
13.09	Magnet support manufacture	Pete, Alberto	It will be heavy!
13.10	Vessel manufacture	External co.	Can be machined from solid rather than fabricated if preferred.
13.11	Vessel internals specification	Christoph	Heason stages, optics mounts, beam dumps
13.12	Vessel internals purchasing	Christoph	
13.13	Laser specification	Christoph	
13.14	Laser purchasing	Christoph	
13.15	Laser safety	Christoph	
13.16	Shielding and interlocks	?	
13.17	Cooling for bending magnet	Duncan Couchman	
13.18	Detector / readout	?	
13.19	Magnet power supply	?	
14.00	**Moving diagnostics**		**Beam after RFQ is ~25mm diameter versus ~ 80mm diameter in LEBT.**
14.01	Function	N/A	To inspect the beam at different places along beam line
14.02	Description	N/A	Existing diagnostics with modifications to suit MEBT.
14.03	Adapt existing	Pete, Alberto, Phil	Insufficient funding or staff for new diagnostics
14.04	Existing slit slit scanners	N/A	Should work fine - resolution 0.1mm?

14.05	Pepperpot	Pete, Alberto, Phil	Too large for MEBT beam. Consider new build.
14.06	Profile	Pete, Alberto, Phil	Useful to have. Quartz may take higher power density due to greater penetration depth.
14.07	Camera position	Pete, Alberto, Phil	Needs to be moved closer to head due to smaller beam. Investigate.
15.00	**Beam dumps**		**One completed by TEKNIKER - in transit**
15.01	Function	N/A	To stop / absorb beam
15.02	Description	N/A	Water cooled aluminium cone.
15.03	Cooling	Duncan Couchman	
15.04	Support structure	Pete, Alberto	
16.00	Public Relations	Dan	