Experiment No.	Description	Justification	What do we want to	Method	Issues	Duration (hours)	Dates	Machine setup
PREPARATION	Implement new bunch monitor equipment and calibrate	This is needed for a number of other experiments	The real time horizontal and vertical position of the beam to be accessed in the control room	Install during maintenance period	Calibration is difficult. We may need to do post-calibration.	4	10-14/3/2014 and set-up in control room 17 or 18/3/2014?	
1. QUICK LINAC MEASUREMENT	Measurement of linac beam quality dp/p and beam size/emittance.	Knowing dp/p and beam size will help the rest of the experiments. This was measured before, but should be re-done before new set of experiments	dp/p, emittance and stability of linac. Does the injection efficiency change when the relative linac phases are adjusted?	dp/p: Use horizontal moveable slit to measure dp/p about 1m downstream from the first bending magnet.	It is difficult to tell the stability, so if it is quick we should measure this before expimernts and again at the end of the visit.	4	19/3/2014	
2. VERTICAL ORBIT MATCHING	Vertical orbit matching	It is difficult to distinguish between injection orbit mismatch and gradual emittance growth.	The aim here is to reduce the vertical orbit mismatch so that emittance growth due to foil scattering can become the dominant process.	Use vertical BPM to observe vertical coherent oscillation and minimise oscillation using injection line steerers	It may be possible to use vertical/horizontal slit in injection line to get a pencil beam, but need to assume we are taking only the central section of the beam. The double slit is available.	8	19-20/3/2014	
3. CLOSED ORBIT DISTORTION CORRECTION	Optimisation of COD correction using main corrector & D pole coils	Need to correct COD to the best of our ability to reduce beam loss due to scraping on aperture. Can get an increase of 16% in field strength to correct using extra coils.	Optimal COD correction scheme. Aim (could) be to just use D magnet coils and eventually switch off main corrector?	Method 1: Radial probe inserted and measure time to loss to establish position of CO.	Interplay between injection mismatch and COD correction	16	21-24/3/2014	RF acceleration ON, adjust main corrector and dipole coils
				Method 2: use RF flat-top (at fixed energy) and the horizontal BPM (triangle plate monitor). Is this really more precise?		16	25-26/3/2014	
4. DISPERSION MATCHING	Measure dispersion function at the foil	The beam size seems large and the foil may only be intercepting part of it, this may be due to dp/p, dispersion or transverse emittance	Dispersion function at foil	Measure H- beam by attaching farady cup to the radial probe in F7. Scale main magnet currents to use 'equivalent momentum' method.	Does the equivalent momentum method work in this case? If we change the magnet strength is the response linear? Proportional? Can TOSCA maps or existing current to field calibration reassure us?	8	27/3/2014	Faraday cup on mover in F7
	Measure dispersion function in the ring as well?	Should be about 0.5m?	Dispersion function in the ring	Use S11 horizontal BPM to measure position, varying main magnet current and using equivalent momentum principle. Could also measure with radial probes at other points if time allows.	This may not be necessary?		28/3/2014?	
	Dispersion matching between BT line and MR	Need to match the optical functions to improve beam quality			Previously done using fluorescent screen. It is hard to see the beam profile due to geometry.	8	28/3/2014	
5. HORIZONTAL ORBIT MATCHING						4	31/3/2014	
6. MEASURE REAL K(R)	Measure the k(r)	Should be able to improve acceleration efficiency using the real k(r)	We will determine the beam energy vs r and translate this to k(r)	Use radial probe to intercept, measure timing to beam loss, use this to estimate beam energy wrt radius		8	1/4/2014	
7. RF OPTIMISATION	RF pattern improvement using real measured k(r)	Significant improvement in efficiency seen by using theoretical k(r), this should improve efficiency further.	Optimum RF pattern for the real accelerator (rather than theoretical one!)		Previous work also included a rough injection optimisation. A direct comparison could be made using same injection setup but with the different RF programmes? This is performed for short 200ns bunch only at present.	6	2/4/2014	

	Momentum dependence on foil position	If we are only scraping part of the beam on the foil, in the presence of dispersion we may be making a momentum selection.	Whether the momentum (and thus optimal starting RF frequency) depends on foil position because of dp/p.			2 2/4/2014
8. TUNE MEASUREMENT	Tune measurement from injection to extraction	Gain a fuller understanding of the machine dynamics	tune variation throughout the whole energy range to compare to simulation		If we rely on horizontal BPMs this may only cover half the aperture. Should we use RF knockout method or perturbator?	8 3/4/2014
MORE THOUGHT/PLANNING NEEDED:						
9. TRANSVERSE COUPLING	Transverse coupling measurement	Ability to use large horizontal beams to mitigate space charge depends on how much coupling is present	Level of coupling in the FFAG	First turn method probably not possible (or accurate enough)	Plan method in more detail.	
10. FOIL ENERGY LOSS	Energy loss at the foil	The energy loss and straggling (tails) need to be compared to simulation	How much energy is really lost going through the foil, so that we know simulations are accurate	Can we use a spectrometer method somehow?	Discuss with Chris R. Not sure how this measurement could be done at the moment.	
LATER EXPERIMENTS						
11. RF STACKING	RF stacking at extraction energy		Can we accumulate a high intensity beam?			
12. OPTICAL FUNCTION MATCHING	Want to measure and match beta functions too	User request for low rep. rate but high current beam		Possibly use mismatch, filamentation should follow and then observe for which setting the minimum emittance growth occurs = matched?	Might take more time than is available in this run Not sure how to measure at present	
13. HORIZONTAL PAINTING	Horizontal orbit mismatching to achieve painting	To determine optimal settings to reduce emittance growth in (particularly) vertical plane	Manipulate the closed orbit at the foil to decrease the foil hitting probability	Measure emittance growth in both horizontal and vertical for various injection settings	It may be difficult to shift the beam from the closed orbit if the beam size is too big!	
14. EMITTANCE GROWTH WITH HIGH BUNCH CHARGE						