

Plasma Lens Tests in May 1992

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Some constraints: We have a week scheduled for these tests before removing the plasma lens and putting in the normal Collector lens (Horn or 20 mm Li lens) between 28 May-2 June (includes public holiday on 28 May and weekend 30-31 May and remote handling work). The PS is in the MD mode on 1-2 June (till midday Tuesday 2 June) and AAC normal setting-up can only commence after that; after this setting-up (Tuesday afternoon, night and perhaps even Wednesday 3rd June), production has to commence to have first deliveries of antiprotons for LEAR on evening of Thursday 4th June. The following run is very long (15 weeks +) and the setting up should be done very carefully to survive till September.

The start-up and setting-up for the plasma lens tests begin on Thursday 21 May officially. However, considering that it is a short PS shutdown prior to that, it is reasonable to be optimistic about first test beams to be available on the evening/night of Wednesday 20th. The AAC Search and power tests, etc. should be completed prior to Wednesday evening, just like it was proposed and carried out in March 1992. Modes 2, 3 (and possibly 4) could be completed in the evening of 20th May. The video image freezing must be ready and available for that evening (**J. Ottaviani** with help from **R. Maccaferri**).

The main issues apart from the plasma lens itself are the various beam-line optics sets. **T. Eriksson** and **S. Maury** will provide these different sets (i.e., 34mm, 36mm, 38mm, 40mm, 42mm, 44mm) for the ACR. However, for the starting conditions for Mode 4 and reverse ejection, an initial (40mm?) set has to be put in to set up and steer through dogleg, the plasma lens correctly timed and pulsed, etc AND using all the usual screens and image freezing methods. If not attempted or completed on evening of Wednesday 20th May, this has to be done first on the morning of 21 May. For the special timing system needs regarding the plasma lens, last year's modifications, presets and methods to change them will be available (**T. Eriksson/J. Ottaviani** say so and will ensure of their availability).

The **plasma lens team** will provide the necessary persons to handle their equipment and vary the lens parameters (up to 5 parameters or so including, pressure, voltage/current, timing, gas composition, etc.) and measure the magnetic focusing (using dedicated system for image-freezing and analyses, different from the one used for the AAC screens, etc.). To ensure efficient running, it is planned to have a shift technician on duty as for normal operation. His role is to look after the beam line and AC ring (injection orbit) aspects of these tests and measurement systems. In line with these preparations the AC injection orbit yield measurement system using the dynamic signal analyzer (FFT) has been tried already with success for low-intensity PSB/PS beam on 22 April (PSB with 4×10^{12} and scrapers resulting in around 2×10^{12} on target from the PS). The $h=6$ bunch rotation system must be operational for AC yield measurements and the availability of **M. Paoluzzi** and other needed persons from the RF group should be assured.

For the later half of the week when real yield measurements are carried out, it is hoped by the plasma lens team that the PS beam quality is of reasonable form (cylindrically symmetric, small emittances...), with beam-emittance measurements carried out as well as corrections where necessary. It is hoped that **M. Martini/Thys Risselada** will be available for this.

The overall strategy of these tests shall be governed by the plasma lens team with agreement of the machine persons where it implicates the latter. An Accelerator Supervisor will be on duty; however, considering the short time and intensive nature of this test period, it is proposed that the supervisor duty period is turned into a shift where necessary. Considering the number of Machine Supervisors available (very few, and some of them with other responsibilities of timing system or transport optics), an initial proposal was to have two supervisor shift periods: (a) 08.00 to 18.00 and (b) 20.00 to 04.00. The overlap from (a) to (b) or vice-versa could be provided by the shift technician on duty where necessary and by the plasma lens experimenters. The shift technician's shift changes are staggered to different times and so there is no problem with that. After the initial day or so and smooth running of the plasma lens tests, the role of the shift supervisor should be secondary and could even revert to on-call duties for machine or beam-line aspects. The following gives a **possible** planning using this proposal which takes into account the expertise/speciality of persons directly involved on one hand and the needs of the plasma lens experiments. The plasma lens persons are in addition to the following and have their own schedule.

	Wedn. 20 MAY	Thursday 21 MAY	Friday 22 MAY	Saturday 23 MAY	Sunday 24 MAY	Monday 25 MAY	Tuesday 26 MAY	Wedn. 27 MAY	Thursday 28 MAY
08.00- 18.00	JO	JO	TE	SM	SM	NC	SM	NC	SB Plasma lens out?
20.00- 04.00	TE	SM	NC	JO	FC	TE	FC	JO	

An alternative proposal is to have 3 'supervisor on-call' shifts rotating over 24 hours; the inconvenience is that this increases the on-call shifts by 50% and takes two (JO and TE) of the six operation technicians out of their rota even more often, causing a heavier load on the remaining four over this week. Despite these difficulties, the proposal is to attempt this, at least so that problems at the start could be minimized. The following gives this schedule for supervisors doing shift and on-call duties as and when necessary.

Three-shift 'on-call' supervisor schedule

	20/5	21/5	22/5	23/5	24/5	25/5	26/5	27/5	28/5	29/5	30/5
00-08 hrs		NC	TE	SM	FC	FC	JO	NC	SM		SM
08-16 hrs	JO	JO	NC	CM	CM	RS	RS	SB	FC Pl. lens out ?	TE Horn Ylds tests	(op- p.m.) Ylds (TE)
16-24 hrs	TE	SM	FC	JO	JO+ NC	TE	TE	CM	(op)	RM+ op	RM+ op

Immediately after the plasma lens tests, a quick horn test is foreseen, needing normal PS intensities ($>1.2 \times 10^{13}$ on target). This would be a short test to measure yields with this 1.4 mm thick horn. This is planned for Friday 29 May, with AAC closure (except for target area installation/removal work) during 30/31 May. If sufficient progress is made, AAC could also be set up during the daytime of this weekend and made ready for the following week. The PS has MD's planned on 1/2 June with first test beams for the AAC not before the afternoon of 2 June. The test horn would most likely be replaced by the 20 mm Li lens for the 16 week physics run till September, if yield tests show significant drop in yields due to this 1.4 mm horn.

After the plasma lens removal and installation of the standard collector lens, a normal beam via the loop set-up will be necessary. This start-up should not pose any major problems because the machines would already be up and running since a week. The following is proposed for machine start, setting-up and supervision:

Monday 1 June -Tuesday 2 June	:	JO
Wednesday 3 June - Friday 5 June	:	TE
Saturday 6 June till 12.00	:	JO
Sunday 7 June	:	
Monday.8 June	:	
Tuesday 9 June - Monday 15 June	:	SM
Monday 15 June - Monday 22 June	:	NC
Monday 22 June - Monday 29 June	:	CM
Monday 29 June - Monday 6 July	:	SM
Monday 6 July - Monday 13 July	:	FC
Monday 13 July - Monday 20 July	:	(SB + TE shifts)
Monday 20 July - Monday 27 July	:	FC
Monday 27July - Monday 3 August	:	NC
Monday 3 August - Monday 10 August	:	SM
Monday 10 August - Monday 17 August	:	CM
Monday 17 August - Monday 24 August	:	JO
Monday 24 August - Monday 31 August	:	FC
Monday 31 August - Monday 7 September	:	NC
Monday 7 September - Monday 14 September	:	JO

The above is after some fine tuning, mainly due to the holiday season, etc. and we still have some problems in certain weeks (13-20 July) and certain days(6,7,8 June) where we need contingencies for no formal supervision.

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