HERA Status

HERA-Experiments Coordination Meeting

Tuesday, November 30, 2004

- Status of commissioning
- Next steps
- Problems with normal conducting magnets

Recommisioning

Complicated recommissioning schedule kept until November 11

- Burned GN Magnet coil
  ➔ 6 working days needed to replace faulty magnets
- Further Magnet Problems: QQ17 OL ground fault (inside cryostat ☹)
- Vacuum leak at new BPM
  ➔ exchanged
- Several water leaks
- Network problems
  ➔ all servers need reboot

About 5-7 days delay in the schedule

	Planned Date	Actual Date
El-Weg Studies	**Friday, October 15, 2004**	**Friday, October 15, 2004**
Hall North PS p	**Thursday, October 14, 2004**	**Thursday, October 14, 2004**
p / e	**Monday, October 18, 2004**	**Monday, October 18, 2004**
e	**Wednesday, October 27, 2004**	**Wednesday, October 27, 2004**
Hall South PS p	**Thursday, October 14, 2004**	**Thursday, October 14, 2004**
p / e	**Monday, October 18, 2004**	**Monday, October 18, 2004**
Large PS Circuits	**Monday, October 18, 2004**	**Monday, October 18, 2004**
Wire installation	**Monday, October 25, 2004**	**Monday, October 25, 2004**
Start-up with protons I	**Friday, October 22, 2004**	**Friday, October 22, 2004**
Start-up with positrons	**Friday, October 29, 2004**	**Friday, October 29, 2004**
e-BPM Recommissioning	**Monday, November 01, 2004**	**Monday, November 01, 2004**
switch to electrons	**Tuesday, November 02, 2004**	**Tuesday, November 02, 2004**
Adjust IR magnet for e-	**Wednesday, November 03, 2004**	**Wednesday, November 03, 2004**
shielding removal	**Wednesday, November 03, 2004**	**Wednesday, November 03, 2004**
survey	**Wednesday, November 03, 2004**	**Wednesday, November 03, 2004**
magnet adjustment	**Thursday, November 04, 2004**	**Thursday, November 04, 2004**
survey	**Friday, November 05, 2004**	**Friday, November 05, 2004**
Start-up Electrons	**Friday, November 05, 2004**	**Friday, November 05, 2004**
first turn steering	**Friday, November 05, 2004**	**Friday, November 05, 2004**
injection optimization	**Sunday, November 07, 2004**	**Sunday, November 07, 2004**
adjust wire system	**Monday, November 08, 2004**	**Monday, November 08, 2004**
completion of shielding	**Tuesday, November 09, 2004**	**Tuesday, November 09, 2004**
GN Exchange		**Monday, November 08, 2004**
electron acceleration	**Thursday, November 11, 2004**	**Tuesday, November 16, 2004**
Electron-proton files	**Friday, November 12, 2004**	**Wednesday, November 17, 2004**
IR-Orbit, BBA, SR-Studies	**Monday, November 15, 2004**	**Saturday, November 20, 2004**
Luminosity Set-up + test	**Sunday, November 21, 2004**	**Sunday, November 28, 2004**
Lumirun	**Sunday, November 28, 2004**	**Friday, December 03, 2004**

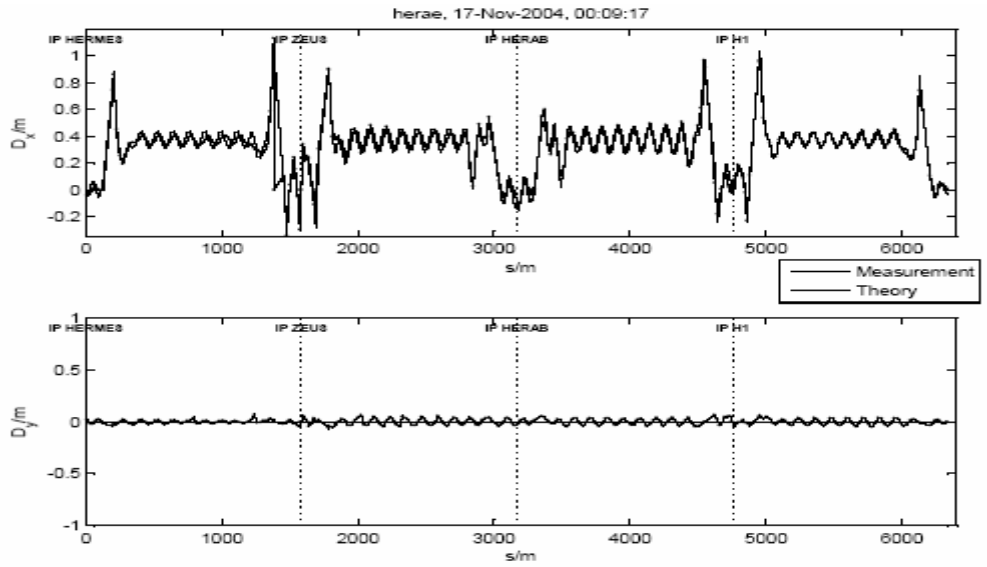
Beam Optics Improvements, Checks and Empirical Corrections

Beam optics have been checked and empirically corrected using the established methods (ORM)

There are no surprises, need gradient correctors mainly in the North IR (as before), residual beta β beat ~10%

Improvements:

Nonlinear tables for ramping to correct for saturation of GI-Magnets, intermediate optics for 23GeV



Dispersion Measurement in new 23GeV optics for smooth transition between injection and luminosity

Concern:

Electron Injection efficiency (more relevant due to expected lower luminosity lifetime)

Measures:

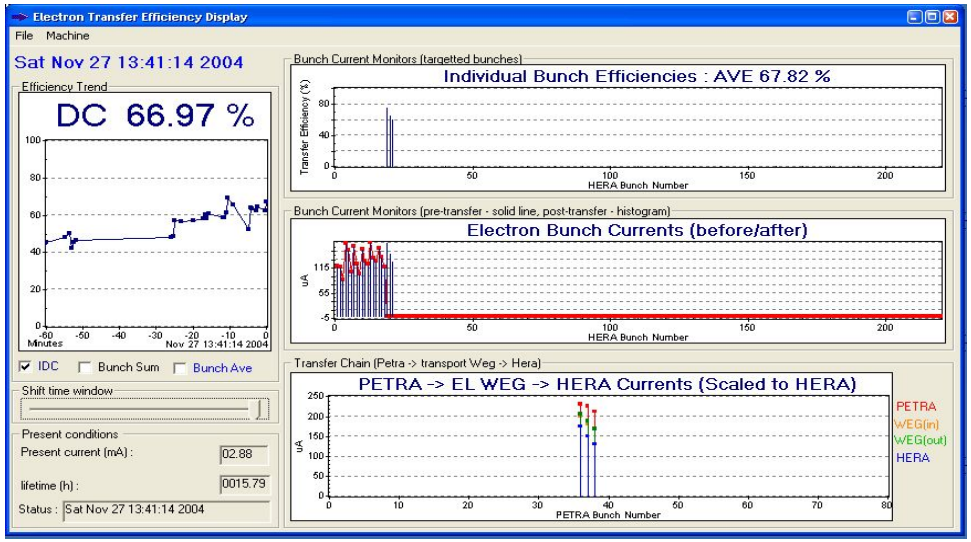
New optics in EL-line and HERAe injection region

Systematic optics measurements in EL-line

Results:

Indication for strong optical mismatch between EL and HERA-e ➔ needs corr.

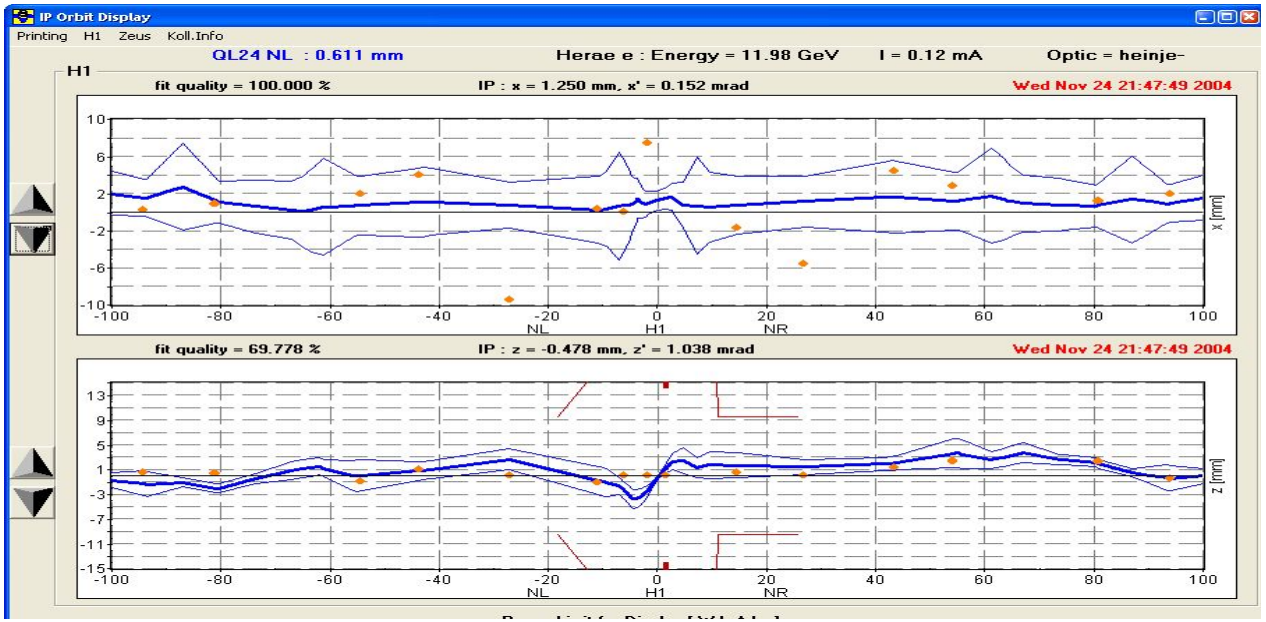
Injection efficiency optimized, maximum <70%, very sensitive not reproducible



Beam-Based Alignment

- **Everything looks fine in the South IR**
- **In the North additional 2mr orbit kickunknown origin(as before)**
- **Explained by misalignment of GO IP-Tip by 7-10 mm? (GO Tip alignment failed)**
- **Attempts to move GO by this amount failed➔ need stronger HG field (+30%)**

➔ Need further study , move H1 detector?



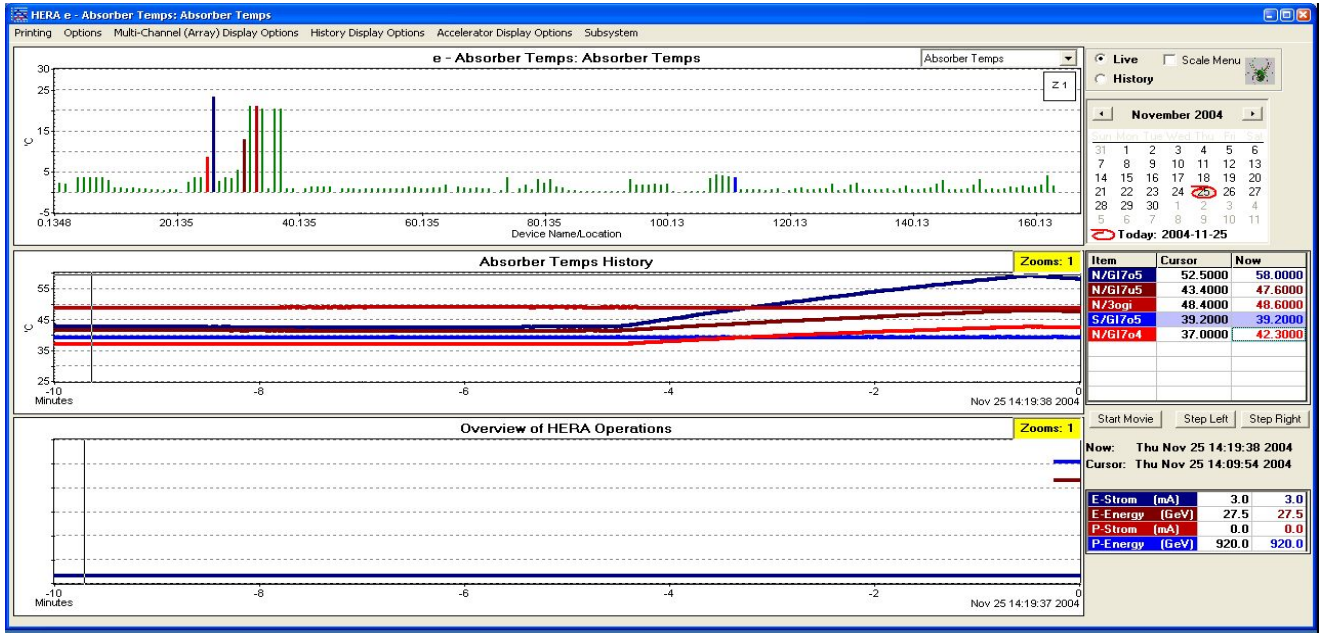
Test Sensitivity of GI-Temperature Sensors

Test on Nov 25 at 23GeV with Ie=6mA

South IR looks ok

North IR: very little space for vertical bumps (temperature dump on Monday morning)

➔ need more study



Next Steps

- Complete BBA and temperature issues
- And set up luminosity running this week

- Start luminosity run end of the week
  (about 5 days delay)

- Maintenance Day Dec 8
- Accelerator studies 3 days starting from Dec 20
- Christmas break: Dec 23-27
- 2005 Luminosity runs on Dec 27

Problems with Magnet Coils

- **QS-Magnets (all coils (36) replaced 1995-8)**
- **QR-Magnets (all coils (72) replaced 2000/2001)**

Remaining potential problems

- **BU-Magnets**
- **QC-Magnets**
- **GN-Magnets**
- **QQ**

BU Magnets

Vertically deflecting 4m dipole at 6 locations a 3 magnets a 2 coils

Inventory 36 coils

Situation:

2 BU Magnets developed a ground fault (NL, NR)

One in addition under suspicion (OR)

6 recently exchanged BU coils has all a problem with water leak underneath insulation➔ all BU coils will fail sooner or later

<u>Spare Coil Situation</u>

- 2 old spare coils originally available
- 9 spare coils built and delivered in 2004 by Efremov
- 24 further spare coils ordered (13 scheduled for July05, the rest until the end of 2005)
- One exchanged coil maybe re-useable

Sum of 36 Coils

Coils Replaced

6 Coils NL

1 Coil NR

QC Magnet

1.03m long Quadrupole magnets, 50mm pole radius, 15T/m

78 used in HERAe, 6 used in HERAp

Speciality: Coil wound with double conductor
The two layers are connected in series

Two failures so far:

- 1996 (short cut via cooling connection)
- 2001: short between neighboured windings

Spares available: 12 spare magnets

Measures planned: nothing so far

GN-Magnet

Function:

Vertically focusing low β septum quad
for protons used in upgraded IR in N & S
24 Magnets installed

Special Property

High field 25T/m, high current density 45A/mm^2

Problem

1 Magnet failed at maximum current 1600A (cooling interrupted)

Spares

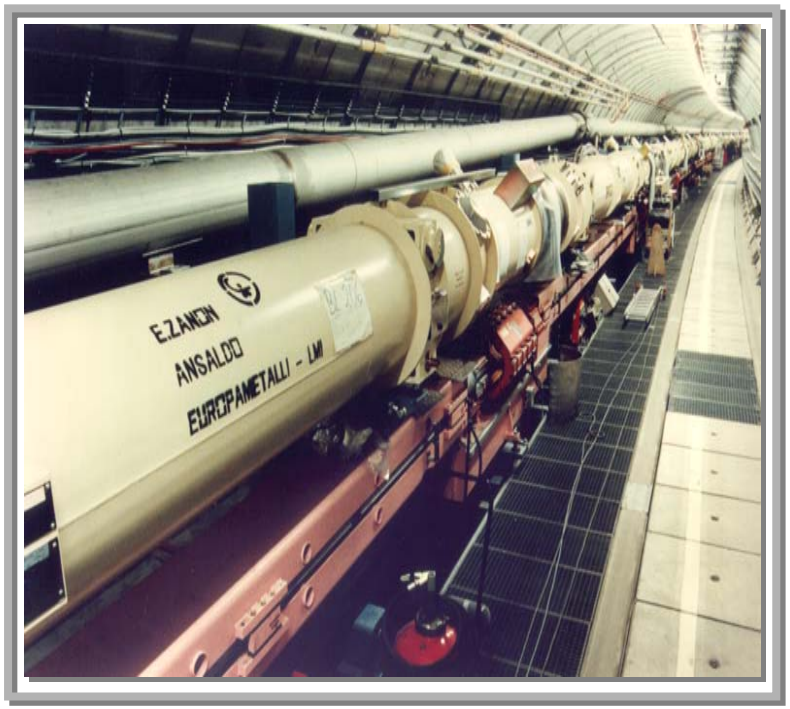
1 spare magnet (used up)

Measures:

Power supply limited to 1470A

QQ Magnet

Superferric Correction Quadrupole in main quadrupole cryostats of HERA-p



- 30 quadrupole magnets installed
- 4 spare cryostats of main quadrupoles

Problem

Ground faults at

QQ17, NL113, QQ17 OL113, QQ19, OL175?

Measures:

- Magnets operated with ground free power supply
- Replacement of main quadrupole magnet prepared (was not performed during shut down)