F. Willeke , MHE 4.September
2000

HERA Report

HERA –Experiments Coordination Meeting

September 4 2000

Run2000

Major Results, Achievements, Problems

Very smooth and efficient running with high luminosity (exceeding the design value) and Polarization.

LUMINOSITY: Record Peak : 2×10^{31} cm^{-2} sec^{-1} **(**design 1.5×10^{31} cm^{-2} sec^{-1})
Record Spec.: 8×10^{29} $mA^{-2}cm^{-2}$ sec^{-1}
Integrated: 66.6 pb^{-1}

BEAM CURRENTS: Protons, peak: > 100mA
Positrons > 50mA

SPIN POLARIZATION: Record 65%, Routine (50-60)%

EFFICIENCY: 56%

MACHINE PHYSICS

Coasting Beam: Improved ($I_{dc} - I_b$<0.5mA) due to coasting beam kicker and optimized rf parameters, Production mechanism still under study.
Tail Shaping: progress and improvements
Longitudinal Stability: Still a factor of 4 in blowup during acceleration, good progress in diagnostics
Beam-Beam: Limits explored, far from present parameters

TECHNICAL Performance No major problems

AUGUST ACCELERATOR STUDIES:

Important Result:

- 72 degree e- Beam optics for 2001 verified, no problems with emittance, aperture and spin polarization (61% achieved even with shifted RF frequency)
- Tools for 2001 recommissioning tested and checked
- Improved diagnostics tested
- Dynamic aperture p-ring remeasured
- Beam Echo measurements performed
- Synchrotron Radiation Suppression p-ring studied
- e- Beam-beam limits explored

Luminosity Upgrade Status

Superconducting Magnets:
GO#1 delivered to DESY, being tested, field quality ok, magnet performance ok, quench protection not yet tested, cryogenic performance poor,
Water condensation problem can be solved by insulating the cryostat at the outside.
GO# 2 should have improved cryogenic properties, it is expected to arrive by mid September at DESY.
GO#3 coil curing in progress.
GG#1: Coil successfully tested in vertical Dewar, performance is good. (500A reached).

Normal Conducting Magnets:
Available, stray field measurements in progress,

Supports, Girders, Bridges:
Bridges equipped with magnets, power test performed, warming-up little (5 degree), 0.3mm magnet movements observed

Vacuum System:
One right-side vacuum system 4mm-18m complete, installed in the magnets on bridge, pumped down, no leaks, other systems: normal progress, they will be available

Diagnostics systems
are on schedule, they will be available.

<u>First Thoughts on Upgrade Recommissioning</u>

Start up ➔ -2 weeks per ring =**4 weeks** ==> Sum = 4 weeks
with detectors turned off
Rotators N, S flat (on in the East)
-First turn steering, beam, store beam, correct orbits
-Checking new and old components with beam
-Check out diagnostics, beam dump, quench protection, bpms, SR monitoring, temperature monitoring

Explore optics and aperture, ➔ 1 week per ring =**2weeks** ==> Sum = 6 weeks
with detectors turned off
Rotators N, S flat (on in the East)
Extensive studies in both rings at several energies
Aperture scans

Turn on detector fields, ➔ **3 weeks** ==> S = 9 weeks
Learn how SC magnets are behaving,
Learn ramping with corrections for motion of S.C. magnets,
remeasure optics,
learn how to decouple the machines

Collide beams, ➔ **2 weeks** ==> S = 11 weeks
-optimize machine parameters (orbit, beam height, working points etc)
-explore optimum luminosity parameters
-luminosity scans

Investigate Synchrotron Radiation, ➔ **2 weeks** ==> S = 13 weeks
-Study beam position and SR positions in the IR
-Test special correction procedures including the bridges

Perform luminosity (days) ➔ **3 weeks** ==> S = 17 weeks
-Runs with exp.'s on to check on backgrounds
-Run with HERA B in parallel

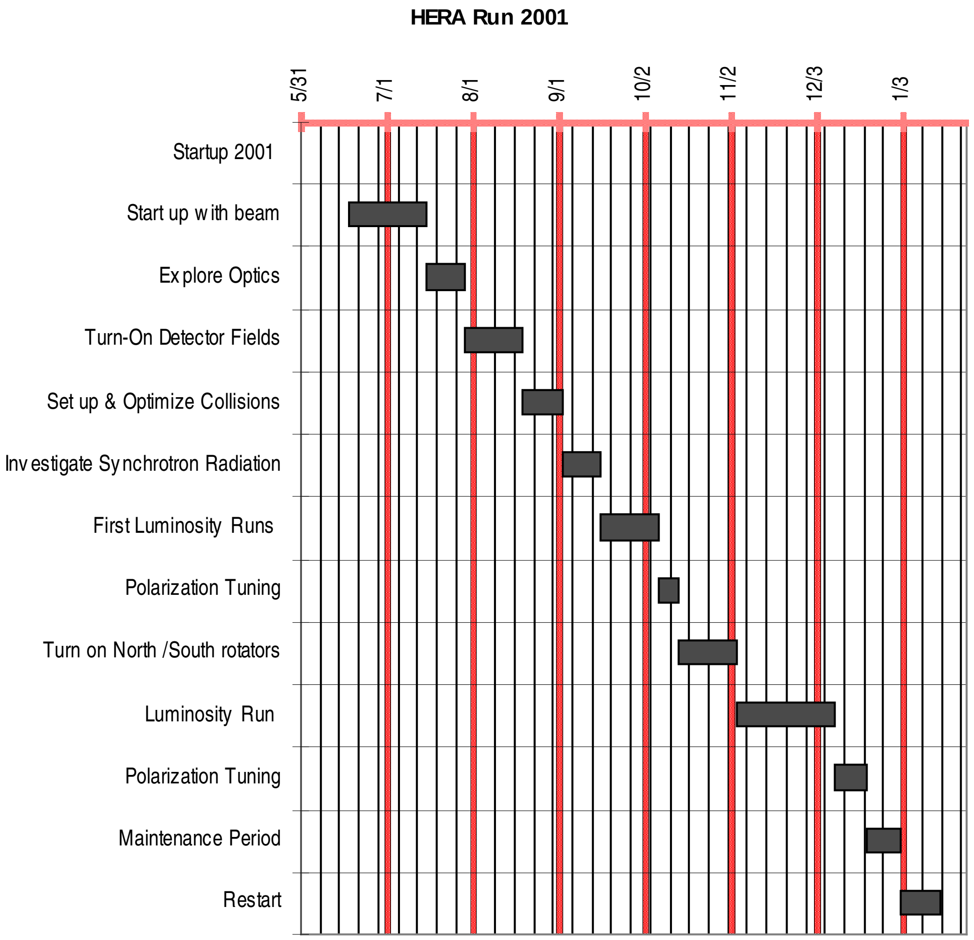
Tune Polarization for HERMES in dedicated shifts ➔ **1 week** ==> S = 18
weeksWith ZEUS/H1 solenoids down N S Rotators flat
HERA-B running possible

Turn on south/North rotators, ➔ **3 weeks** ==> S=21 weeks
Orbit, optic check,
Set up luminosity
Tune polarization
HERA-B running possible

Luminosity running ➔ **6 weeks** ==> S=27 weeks
with frequent machine studies

Set up polarization with detector fields on ➔ **2 weeks** ➔ S=29
(Start with detectors off, ramp them up bit by
bit, retune....

Goal: Start normal running with long. Polarization at N,S,E in January 2002.



Luminosity Monitors needed   mid August
Detectors needed September 1st.

HERA PARAMETERS RUN 2001 (proposed/expected)

Particles		Protons	Positrons
Beam Energies	[GeV]	**920**	**27.52**
Total Beam Currents	[mA]	**90**	**20-40**
Emittances	[nm]	**5**	**22**
Beta functions x	[m]	**2.45**	**0.6**
y	[m]	**0.2**	**0.25**
Initial Luminosity	[10^{31}cm^{-2}sec^{-1}]	**(1.5-3.5)**	
Efficiency	[%]	**40%**	
Run Time	[days]	**80**	
Integrated Luminosity	[pb^{-1}]	**20-40**	