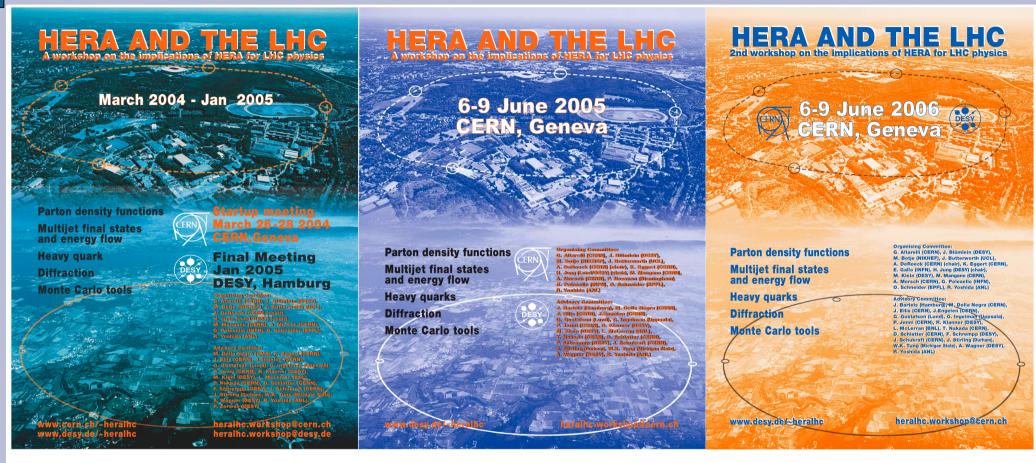
Where it all began ...

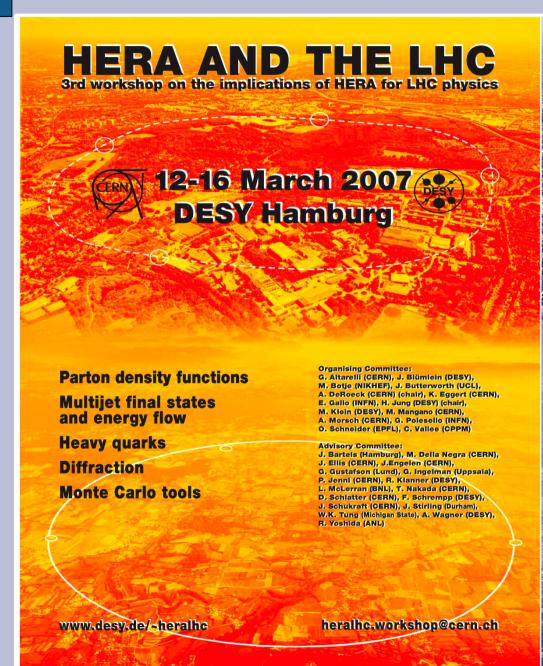


Highlights of 1st workshop !!!

"...The mechanic, who wishes to do his work well, must first sharpen his tools ..."

—Chapter15, "**The Analects**" attributed to Confucius, translated by James Legge. (from X. Zu at DIS05)

... and where we are now ...





- 4th HERA-LHC workshop marks the end of an era:
 running HERA machine before LHC starts data taking
- A lot has been achieved:
 - → To encourage and stimulate transfer of knowledge between the HERA and LHC communities and establish an ongoing interaction.

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```
startup meeting: 26-27 March 2005 CERN (~ 250-300 participants)

2nd meeting: 6 - 9 June 2006 CERN (~150 participants)

3rd meeting: 12-16 March 2007 DESY (~160 participants)

4th meeting: 26-30 May 2008 CERN (~190 participants)
```

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 - → To increase the quantitative understanding of the implication of HERA measurements on LHC physics.
 - To encourage and stimulate theory and phenomenological efforts.
 - To examine and improve theoretical and experimental tools.

Well done ... !!!!

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 - → To encourage and stimulate transfer of knowledge between the HERA and LHC communities and establish an ongoing interaction.
 - → To increase the quantitative understanding of the implication of HERA measurements on LHC physics.
 - To encourage and stimulate theory and phenomenological efforts.
 - → To examine and improve theoretical and experimental tools.
 - → To identify and prioritize those measurements to be made at HERA which have an impact on the physics reach of the LHC.



Can HERA still do something?

- Many of precision HERA results are expected in next 1-2 years
 - ullet $F_2, lpha_{
 m s}$ are being prepared, F_L coming soon
 - combined pdf fits etc
- active and lively discussion at DISO8 on future measurements at HERA
 - many old and new ideas for additional measurements, for example:
 - of pdfs of different quark flavours to uPDFs
 - → from hadronization parameters (via tracks, multiplicities, particle spectra, energy flows) over underlying events to properties of jets (R- dep of jet xsections)

Jets, G. Salam (p. 26) └─Closing

Conclusions

Unlocking the power of jets at LHC means going beyond stale discussions of whether we really need IRC safe algorithms.

For each IRC unsafe alg., there's a good safe alternative HERA offers a good example in its approach to jets

The questions we face on jets cover LHC's whole dynamic range:

From ~ 1 GeV to multi-TeV The scales mix: UE with pileup with EW with TeV Understanding of low scales, substructure \leftrightarrow HERA

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 - → from hadronization parameters (via tracks, multiplicities, particle spectra, energy flows) over underlying events to properties of jets (R- dep of jet xsections)
 - → of fragmentation functions also for charm
 - → is hadronisation universal?
 - direct gluon determination with heavy quarks
 - diffraction, saturation and survival probabilities
 - → jets and underlying events also in diffraction (R-dep)
 - → and many more
 - summary of old and new ideas for measurements will be put on web page !!!!
- for completion of program, getting most out from HERA, DESY support is granted !!!

Future ...

- 4th HERA and the LHC workshop marks end of an era ...
- → summarize achievements, progress and open issues with proceedings
- Questions (obvious....) for proceedings:
 - do we have the necessary tools for the LHC start?
 - pdfs, jets, HQ, diff, MCs?
 - where are areas, which need urgent further work?
 - where are areas, where progress can be made in the next 1-2 years?
 - what has been achieved compared to 2006, what is still missing?

Future ...

- 4th HERA and the LHC workshop marks end of an era ...
- → summarize achievements, progress and open issues with proceedings
- Proceedings: online and printed as common DESY-CERN report
 - Consistent and common report per working group
 - with subsections covering different areas
 - WG conveners produce skeleton and contact people to contribute
 - no individual contributions !!!
 - 100 pages per WG
 - deadline for 1st draft of WG report: 1 Sept 2008
 - final version deadline: 15 Sept 2008
 - style file as for 2006 proceedings, will be available from web page
 - print proceedings in October 2008

Future workshops?

- present type of HERA and the LHC workshops comes to an end
- BUT keep momentum and good collaboration alive ...
- several interesting, new & challenging options for the future:
 - → specialised working groups, like PDF4LHC etc
 - → extended workshop "QCD at the TeV scale " including HERA, TeVatron and RHIC or
 - extend workshop character, build real working groups or
 - → etc ...
- options will be discussed with conveners, org and advisory board
- PLEASE, give input and try to influence to outcome of the discussion, decision together with publication of proceedings in Nov 2008

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- Have a good and safe trip back home