

What HERA still could provide ?

H. Jung (DESY) A. De Roeck (CERN), R. Thorne (UCL)

- Introduction and goals
- Provocateurs talks (experiment & theory)
- Discussion (5 min contributions)
- Conclusions ?

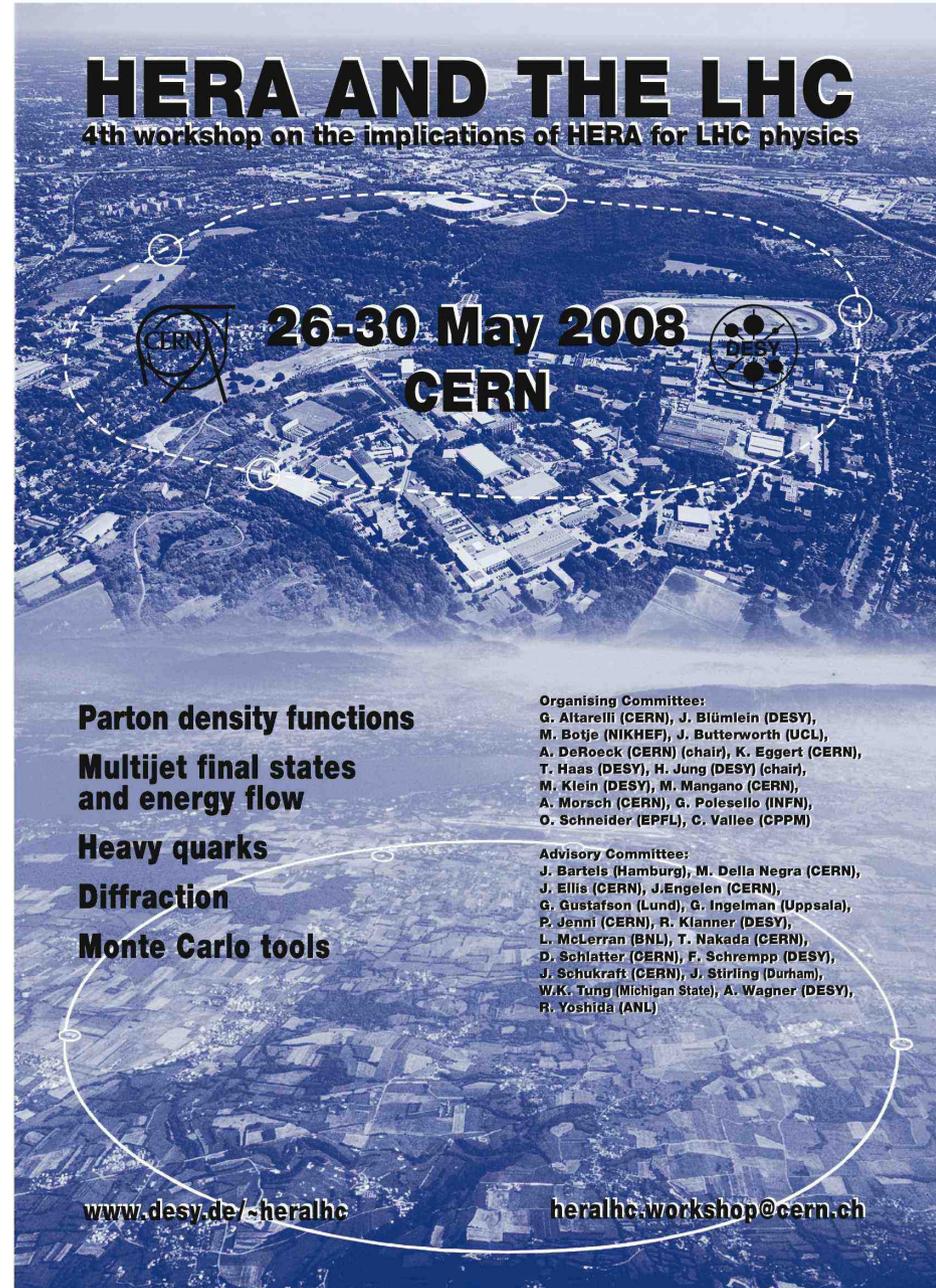
What HERA still could provide ?

H. Jung (DESY) A. De Reock (CERN), R. Thorne (UCL)

- was triggered by M. Strikman, who suggested to investigate what HERA data can be still used for, with perspective to LHC **BUT** also on its own ...

Introduction

- **HERA & the LHC workshops: 2nd** series end on 25-20 May at CERN
 - shown importance of HERA measurements and investigations for LHC
- **BUT** also on its own in terms of QCD



HERA AND THE LHC
4th workshop on the implications of HERA for LHC physics

26-30 May 2008
CERN

Parton density functions
Multijet final states and energy flow
Heavy quarks
Diffraction
Monte Carlo tools

Organising Committee:
G. Altarelli (CERN), J. Blümlein (DESY), M. Botje (NIKHEF), J. Butterworth (UCL), A. DeRoeck (CERN) (chair), K. Eggert (CERN), T. Haas (DESY), H. Jung (DESY) (chair), M. Klein (DESY), M. Mangano (CERN), A. Morsch (CERN), G. Polesello (INFN), O. Schneider (EPFL), C. Vallee (CPPM)

Advisory Committee:
J. Bartels (Hamburg), M. Della Negra (CERN), J. Ellis (CERN), J. Engelen (CERN), G. Gustafson (Lund), G. Ingelman (Uppsala), P. Jenni (CERN), R. Klanner (DESY), L. McLerran (BNL), T. Nakada (CERN), D. Schlatter (CERN), F. Schrempp (DESY), J. Schukraft (CERN), J. Stirling (Durham), W.K. Tung (Michigan State), A. Wagner (DESY), R. Yoshida (ANL)

www.desy.de/~heralhc heralhc.workshop@cern.ch

Goals of this discussion session

- HERA detectors and data are now best understood.
Allows for
 - measurements with highest precision
 - new measurements because detectors are understood, which were never possible before
- What are the fundamental questions, which still need an answer ?
 - Should think of measurements and investigation (theory)
which are of importance for
 - SM (QCD & EW)
 - LHC and possible upgrades
 - further projects

Keep in mind ...

- Keep data from HERA experiments alive ...

Make sure that

- data are readable/accessible for a long time (> 10 years)
- raw - and reconstructed data are kept ? (for further reprocessing ?)
- necessary software still exists and is running
- knowledge about detectors and data are properly documented and available

Aims of this discussion

- Start now with brain-storming discussion (without restrictions...)
 - what measurements would we like to have, if we would have all possibilities ?
 - which theoretical - phenomenological developments are required ?
 - what is needed for a better and deeper understanding of QCD & EW
- WHAT are the fundamental questions we need to answer ?

Aims of this discussion

- Start now with brain-storming discussion (without restrictions...)
 - what measurements would we like to have, if we would have all possibilities ?
 - which theoretical - phenomenological developments are required ?
 - what is needed for a better and deeper understanding of QCD & EW
- WHAT are the fundamental questions we need to answer ?
 - if we have good points, I am sure, we will find resources to work on them
 - discussion NOW and in next month ...

Aims of this discussion

- from NOW until HERA - LHC workshop in May 2008
 - structure discussion
 - get some points worked out more detailed
 - prepare wishlist from
 - experimentalists
 - theorists/phenomenology
- at HERA - LHC workshop
 - further discussion
 - present structured wishlists
 - what still can/should be done with HERA data
 - which new developments/investigations are needed

A few points ...

- **Hadronization (ideas from G. Gustafson)**
 - is DIS the same as e^+e^- (i.e. strange/light quark ratio), what about pp ?
 - production of antiprotons, charm in fwd region... deviation from LEP
 - use HERA to determine hadronization parameters, as done for LEP
- **Jet algorithms and underlying events**
 - studies in a clean environment
- **Do we really need NLO, NNLO etc ?**
 - is it telling anything new or just keeping us busy for the next 10 years ?
 - importance of resummation methods
- **NNLO + PS or more effective approaches like uPDFs**
 - extensive tests in jet/ heavy quarks area needed
 - measurements in resummation region

A few more points ...

- Factorisation - Factorisation breaking
 - collinear vrs kt-factorisation (also at large x , double updfs etc)
- Small x
 - until where is linear evolution trustable ?
 - are nonlinear effects or resummation needed ?
- unification of diffraction with inclusive scattering
 - is diffraction ($\sim 10\%$) part of initial parton distribution
- unification of diffraction and multiparton scattering
 - consequences for factorisation

and NOW ...

Thanks for all your
input and interest.....

and NOW ...

Get a statement from the
DESY research director

and NOW ...

start the discussion
with two
provocateur talks