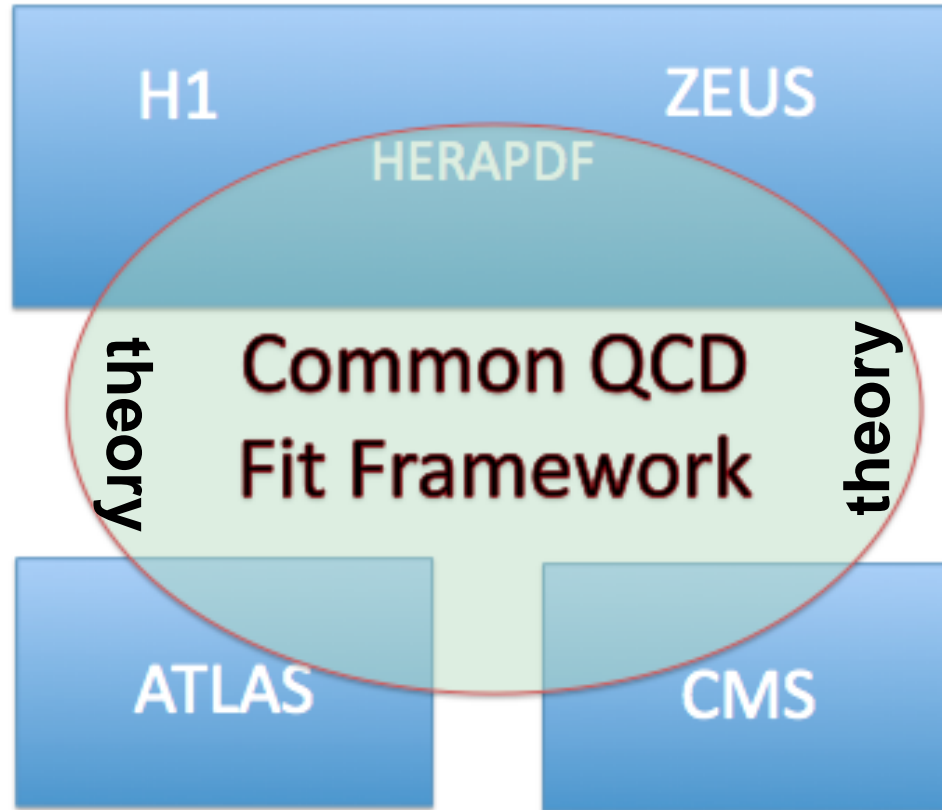


PDFs fit in the LHC era: a possible scheme



+LHCb, ALICE...

Minimal needs identified:
2 Project managers (ATLAS/HERA, CMS/HERA)
Technical support

Letter of intent submitted to the 72nd PRC
October 10, 2011

Proposal of a collaborative project for the determination of the proton structure using data from deep-inelastic scattering at HERA and proton-proton collisions at LHC

Executive summary

A project proposal for a long-term international study group on the proton structure is presented. The goal of the project is to extract parton distribution functions (PDFs) in a most coherent manner by simultaneously exploiting the data taken at the electron-proton collider HERA at DESY and the data from the proton-proton collider LHC at CERN. As exemplified with the successful HERAPDF approach such a project would profit enormously from the fact that the involved physicists have complete insight into the complex systematics and thus the full potential of the input data. Therefore the project has the capability to improve the quality of the analyses at LHC and to enhance the physics return of the measurements, by delivering robust tools for PDF fits to be used within the experimental activity. A strong collaboration with theorists in the field is another important ingredient of the project. In the long-term, additional relevant data from other experiments may be included as well, to use all possible information and perform global consistency checks. The project is timely and is expected to last over the LHC lifetime, taking advantage of the improving precision of various standard measurements with increasing luminosity. It makes use of the unique position of DESY with three major advantages: home laboratory for HERA collaborations, host of two large ATLAS and CMS groups and a strong theory center for precision QCD calculations. Furthermore, the project is defined such that the collaboration with other experimental and theory groups is exploited and encouraged. Minimal requirements for the project are already identified at this stage and consist of at least two tenure-track positions with combined activity on fits and data analysis at LHC. A strong technical support should be allocated as well. A precise description of the operational model will be formulated at a later stage in a blueprint document, following an agreement on the present proposal.

The authors of this proposal are members of the HERAPDF group formed by the H1 and ZEUS collaborations with a strong support from ATLAS and CMS groups in DESY as well as from the PDF experts in the DESY theory group. Other experimental and theory groups will be invited to join the project.

Perspectives

- PRC encouraged H1 and ZEUS to further define the project.
- **Issues:**
 - Refine and formalise the collaboration goals
 - Adopt a collaborative framework including HERA and LHC experiments
 - Define the management and operational model
 - Identify the long term stakeholders
 - DESY
 - Expression of interest from other institutes
 - Heidelberg, Saclay, Orsay, Oxford, Marseille, Munich, Cracow Others??.
 - Identify funding schemes: mid- and long-term solutions to be found
 - Virtual Institute Proposal (Germany) and other contributions
- **A long term project should be installed by 2012**

Discussion, collect arguments

Question	Answer, reasons
1) Is there an interest to continue PDF-like studies in the LHC area?	Yes (physics case)
2) Is there a need for a collaborative approach on concrete objectives?	
3) What would be the goals? a) Gather and preserve expertise: fitting code, theory routines, data sets b) Provide and maintain a coherent fit framework (user oriented) c) Confront, benchmark theory. approaches d) Produce/provide PDFs+errors (benchmarks)	
4) Is extra support (funding) needed?	if yes, then 5) and 6), no way out
5) Which form should this take? a) Technical infrastructure b) Study Group c) New Collaboration d) Other?	
6) Who are the stakeholders? a) Individuals, free mandate FL:* B:1 b) Exp./Th. Collaborations (endorsed mandate) FL:** B:1 c) Institutes FL: *** B: 2 d) Funding agencies : **** B:2	
7) How would you support or participate to such an initiative?	FTE 2012-2013 and after 2014