Working Group 3

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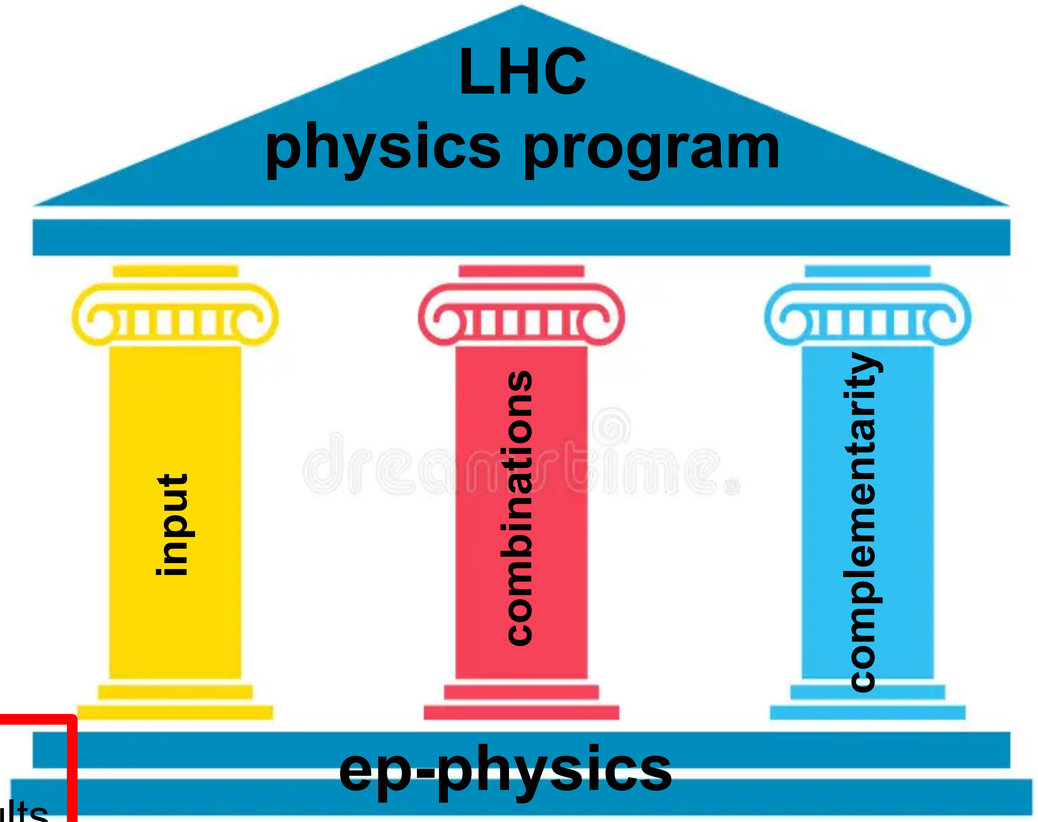
and discussions with Monica and Uta

ep/eA@CERN coordination meeting
17 April 2024

Synergies between LHeC and HL-LHC physics

→ Empowerment of LHC program
→ Input to pp physics analyses improving sizable uncertainties and limitations

High precision *ep* measurements used as input in LHC analyses for their improvements



***ep* analyses with sensitivity complementary to LHC analyses to complete the overall LHC physics program**

→ high precision QCD analyses
→ high precision measurements of specific parameters
→ searches in complementary phase space regions

→ Competitive precision of measurements and combination of results
→ uncorrelated uncertainties → resolve correlations in parameters of interest
→ resolve common/correlated uncertainties between ATLAS&CMS
→ empowers global fits

***ep* measurements to considerably improve LHC physics output, e.g. in final combinations**

ESPP Potential Plan

- Plans very similar to WP2
- maintain our efforts to generate updates of studies using recent LHC results, e.g. to illustrate the need for better PDFs
  - e.g. the recent $\sin^2\theta$ result from CMS has sizable PDF uncertainties
  - e.g. the alpha_s results (from CMS) have important PDF uncertainties. Worthwhile to mention: these alpha_s results take HERA data plus LHC data. The HERA data is not too bad, but if it should still be used in the 30s and 40s with the LHC data is probably not a good advertisement for the LHC…

  → continue to try to convince in particular LHC colleagues of improved accuracies due to LHeC/FCC-eh
- Analysis proposals: keep updating analyses of precision measurements and combinations using improvements from new results and developments to optimize in accuracy
- also here: establish and keep close connections to phenomenology community to find new possibilities of complementary analyses to complete overall LHC physics program
- attract and make it easy for analysers (such as bachelor or master students or PhD students in their last year) to engage with ep studies and extend on our software documentation/ tutorials etc.