ESR13
Milan University

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UNIVERSITÀ DEGLI STUDI
DI MILANO

Higgstools Kickoff

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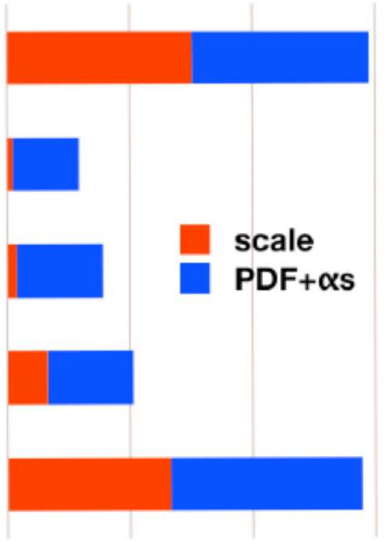
THE JOB DESCRIPTION

- SUPERVISORS: STEFANO FORTE (TH)& LEONARDO CARMINATI (ATLAS)
- GOAL: STUDY THE IMPACT OF PDF UNCERTAINTIES (ESPECIALLY THEORETICAL UNCERTAINTIES), HIGHER ORDER CORRECTIONS TO HIGGS PRODUCTION MECHANISMS, MONTE CARLO EVENT GENERATION, AND EXPERIMENTAL TECHNIQUES, SPECIFICALLY IN WHAT CONCERNS THE SUBTRACTION OF UNDERLYING EVENTS AND PILEUP (WP3)
- SECONDMENTS: CERN (MICHELANGELO MANGANO), EDINBURGH (RICHARD BALL, ANDY BUCKLEY (?)) + PRIVATE SECTOR

WHY (J. Campbell, HCP2012)

		σ (8 TeV)	uncertainty
NNLL QCD +NLO EW	gg→H	19.5 pb	14.7%
	VBF	1.56 pb	2.9%
NNLO QCD +NLO EW	WH	0.70 pb	3.9%
	ZH	0.39 pb	5.1%
NLO QCD	ttH	0.13 pb	14.4%



- PDF UNCERTAINTY DOMINANT
- IN SOME CHANNELS, SCALE UNCERTAINTY ALSO VERY LARGE

WHAT

- (I) CONTROL, CHARACTERIZE & MINIMIZE PDF UNCERTAINTIES
- (II) ESTIMATE AND POSSIBLY REDUCE UNCERTAINTY FROM MISSING HIGHER ORDERS
- (III) HOW CAN ONE ESTIMATE RELIABLY PDF UNCERTAINTIES?

HOW (AND WHERE)

- (I): PDFs (NNPDF+CERN)
  - MAXIMISE THE IMPACT OF LHC DATA ON PDFS (fast interfaces, aMC@NLO)
  - RESUMMED PDFS & "MONTE CARLO" PDFS (dedicated matched PDF sets)

  ⇒ DURHAM (Krauss)

- (II): HOs (EDINBURGH)
  - COMBINED BFKL+SUDAKOV RESUMMATION
  - APPROXIMATE HIGHER ORDERS FROM ANALITICITY

  ⇒ LOUVAIN(NIKHEF) (Maltoni)

- (III): THUs
  - PDFS WITH THEORETICAL UNCERTAINTY
  - THEORETICAL UNCERTAINTY & ALL-ORDER PERTURBATIVE BEHAVIOUR

  ⇒ TORINO (Passarino)