



Precision EW physics at the CERN LHC status of the Milano unit

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Pisa, February 7th 2020

Members and facilities in Milano

Personale T.D. + assegni da rendicontare	Attrezzature	consulenze	spese generali	totale contributo MIUR	cofinanziamento	totale progetto
80000	0	0	45000	125000	30000	155000

Directly involved in the PRIN project

- Alessandro Vicini (UniMi)
- Narayan Rana (INFN postdoc until September 2020, then PRIN postdoc until September 2021)
- Simone Devoto (PRIN postdoc starting in October 2020 (2 years))

Collaborations

- Fulvio Piccinini, Carlo Carloni Calame, Guido Montagna, Oreste Nicrosini, (Pavia), Mauro Chiesa (Annecy)
- Emanuele Bagnaschi (PSI), Giuseppe Bozzi (Pavia)
- Giancarlo Ferrera (UniMi)
- Roberto Bonciani (Roma La Sapienza), Federico Buccioni (Oxford), Giuseppe Degrassi (Roma3)

Computing resources

- theory cluster: 1106 standard jobs executable on 40 servers with a batch queue system,
 - 1 server hosting 1 Tesla P100
 - 1 server with 256 GB RAM for intense algebraic manipulations
- department infrastructure: O(3000 jobs are virtually available, via Condor)

Other members of the Milano phenomenology group

- Stefano Forte, Stefano Carrazza, Marco Zaro, Claudia Frugiuele, postdocs of the N3PDF ERC grant

Current topics under study: the Drell-Yan processes

Current activities

Exact $O(\alpha\alpha_s)$ corrections

- corrections to on-shell Z production (see Narayan's talk)
- full Drell-Yan (already first few preliminary steps)

Determination of $\sin^2\theta_{\text{eff}}$

- new EW input scheme developed to clarify the procedure used to extract $\sin^2\theta_{\text{eff}}$ from the data

QCD uncertainties on the determination of the EW parameters: PDF uncertainties

- MW determination (see Emanuele's talk)
- $\sin^2\theta_{\text{eff}}$ determination (photon-induced contributions, study of correlations)

Longer term plans

New simulation tools

- extension of the current simulation tools (POWHEG, DYRes) to include the new analytical results fixing the matching ambiguities on the combination of QCD and EW corrections

New analysis tools

- development of a theoretical analysis framework to classify different sources of uncertainties and to provide (and receive!) guidance for the experimental analysis