Stefano Frixione

Review of QCD and LHC activities

CERN Theory Group retreat

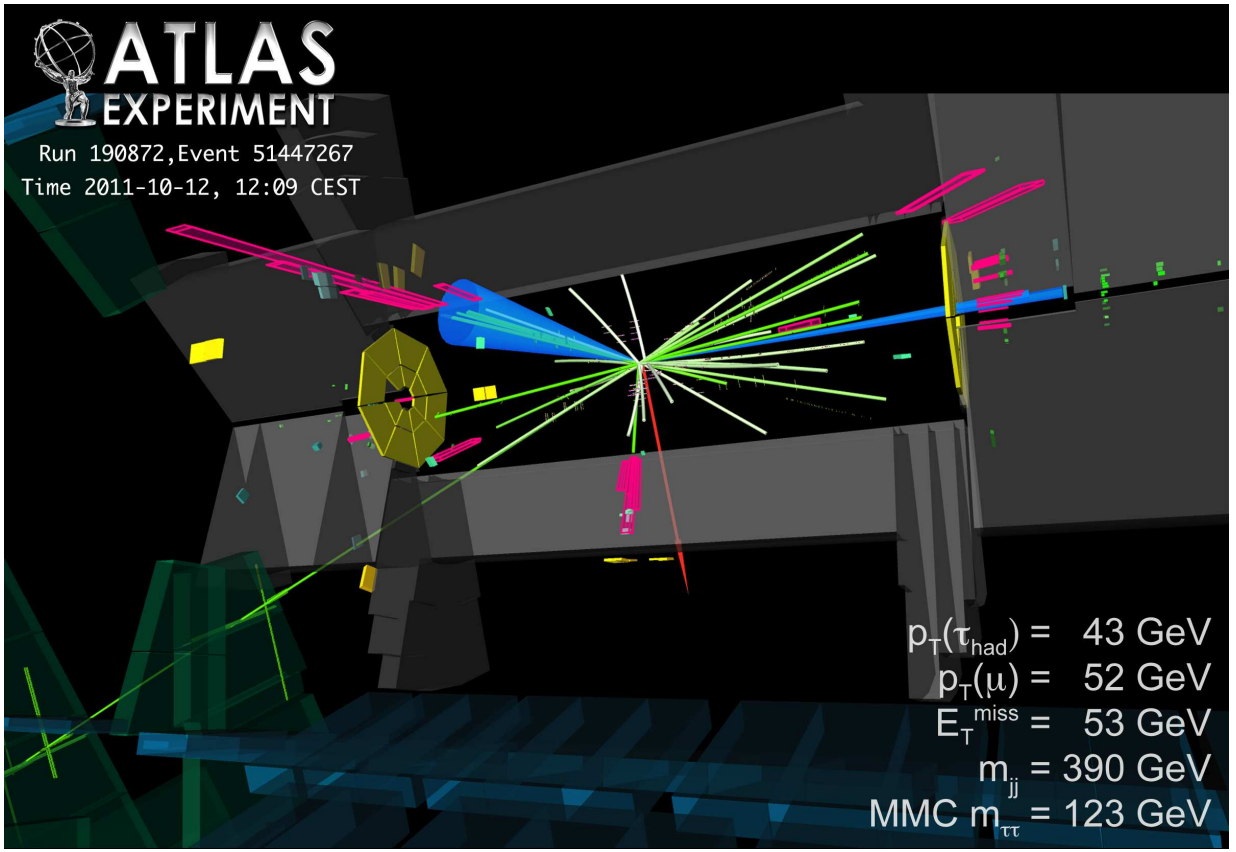
Thoiry, 9/11/2012

People with QCD/pheno interests

- Fellows, CERN+ERC (just arrived or about to)
  Luca Barzè, Rikkert Frederix, Benjamin Fuks, Franz Herzog, Tom Melia, Gabor Somogyi, Korinna Zapp
- Fellows (here since 2011)
  Keith Hamilton, Alex Mitov, Juan Rojo
- Staffs
  Michelangelo Mangano, Gavin Salam, Peter Skands, SF
- PDAS's, students, visitors

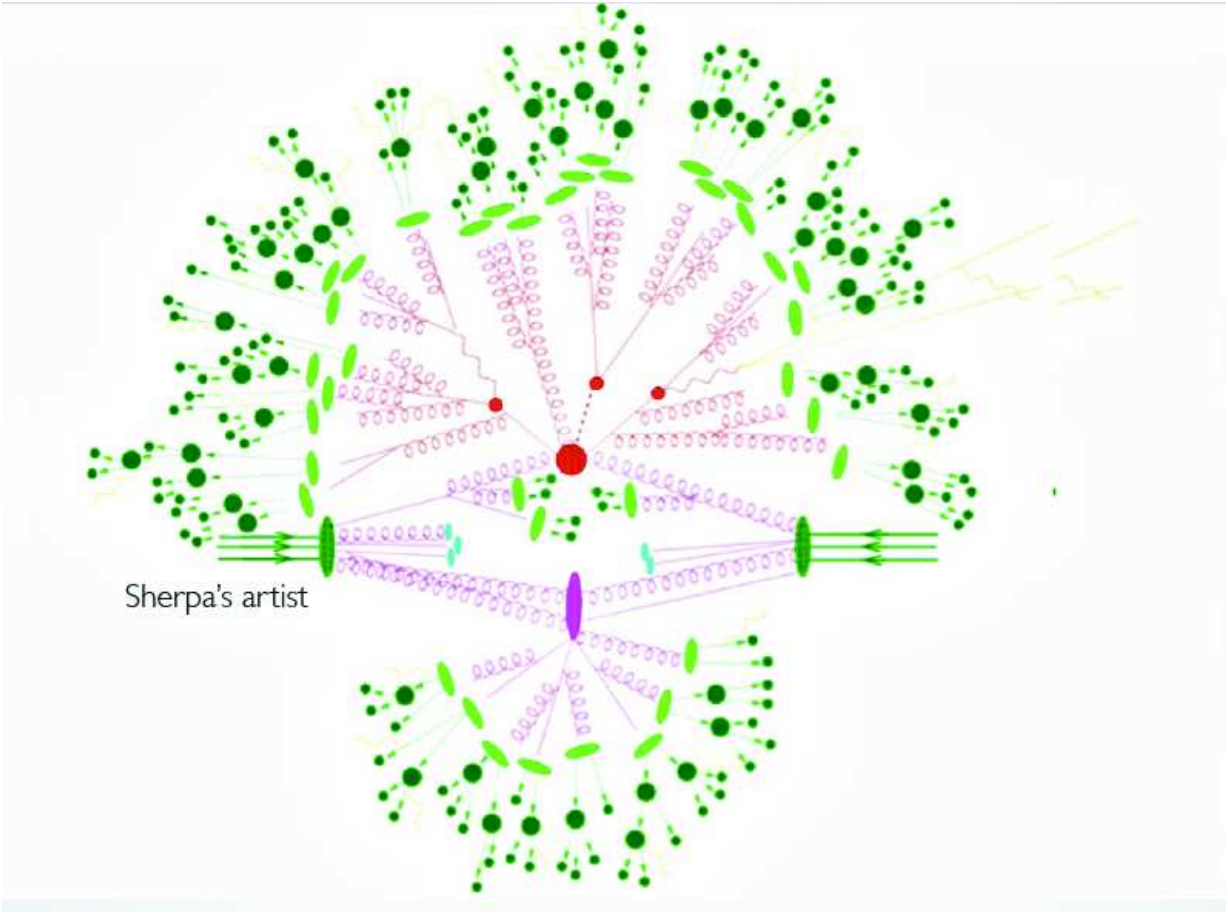
Activities in Lattice Field Theory and Heavy Ion physics will be presented by Martin Lüscher and Urs Wiedemann

What we do for a living



- Predictions (drive/suggest search strategies)
- Postdictions vs data (constrain discoveries, extract parameters)
- Invent new ways of computing cross sections, new observables
- Provide experiments with their workhorses

How we do it



$$d\sigma_{H_1H_2\to X}(S) = \sum_{ij}\int dx_1 dx_2 f_i^{(H_1)}(x_1,\mu^2) f_j^{(H_2)}(x_2,\mu^2)$$

$$\times\, d\hat{\sigma}_{ij\to X}(\hat{s}=x_1x_2S,\mu^2) + \mathcal{O}\left(\left(\frac{1\text{ GeV}}{\mu}\right)^{2k}\right)$$

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  - Approximate, exclusive all orders (parton showers) (Hamilton, Skands)

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- Pheno
  - Lots of interactions with experimenters, fruitful for both sides (top → Mangano, Mitov; jets → Salam; BSM → Fuks; .....)

The bottom line is that, whatever your question on QCD and collider physics, you are very likely to find an expert answer just next door

We are lucky to have a very active and very diverse group

On thursdays and fridays there are seminars on phenomenology and related technical methods:

Collider Cross Talk

Particle and Astro-Particle Physics Seminar

The organizers and the speakers will be happy if you will attend

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- Current interests include: the role of EW effects in the interpretation of LHC data; NNLO (and beyond) computations (IR structure of QCD); $1/N_C$ expansion with its applications to higher-order computations