Ideas for a common school on NLO, MC, and PDF issues at University of Freiburg

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- Why such an event and why in Freiburg?
- Audience: whom to address?
- Intention: what is the goal of the school?
- A possible outline of a programme
- Date and some first organisational issues

Why a combined event and why in Freiburg?

- previously: separated schools on MC and PDF issues

  in addition: following items central topics of analysis activities in the alliance
  - MC tuning (e.g. underlying event)
  - matching of parton shower and matrix elements
  - inclusion of loop corrections in multipurpose event generators

- idea: (suggested by Thomas S.-S. during visit to FR)
  - combine this interleaved activities in one educational event
  - present progress of these alliance projects to a wider audience
  - teach students and postdocs how to use these new tools (+ older ones)

- why in Freiburg?
  - idea born in Freiburg
  - appreciation of alliance to have such kind of events also outside DESY
  - local expertise in all three areas by FR theorists benefitial for idea

of course event will take place in context of the analysis centre activities

and we hope the AC will help a lot in organising school based on great experience

Audience and goal?

- Audience:

  students and postdocs performing phenomenlogical studies and data analysis (level oriented at „average“ experimentalist)

- Goal:

  enable audience to perform up-to-date/state-of-the-art
  - Monte Carlo event generation
  - cross section normalisation
  - evaluation of uncertainties (QCD scales + PDFs)
  - use of NLO standards worked out at Les Houches 09

  no intension to explain in detail:
  - how PDF extraction is done and theoretical calculation needed for this
  - which techniques are used and developed in loop calculations
  - how phase space integration or ME calculation is done in best way

  → use programs, codes to some extent as a „black box“
  but know pitfalls and limitations and learn exactly how to use them correctly
  explain and exercise this with a few processes relevant for first LHC analysis
  e.g. Z(W)+X, WW(ZZ)+X, t tbar +X, (maybe 1 Higgs and SUSY process)

A possible agenda of the school

- 4 days: start Monday noon, end Friday noon

- interleave of lecture, practical exercises/tutorials and discussion forums with a time fraction of roughly 40/40/20%

Monday: Introduction day

Afternoon 14 to 18: introduction/overview of NLO calculations and MC generators
- why interfacing LO generators with NLO calculations?
- which NLO calculation can be combined with which generator?
- which PDFs to use with NLO calculations and event generators?
- what are limitations, strengths and weaknesses of different tools? (only on-shell, no PS+ME matching, ...)

Tuesday: PDF day

Morning: 9 to 12 - introduction to different PDF sets (CTEQ,MSTW, NNPDF…) and methods of uncertainty evaluation and their use

Afternoon: 14 to 19

14 to 17 - computer exercises on how to evaluate PDF uncertainties for different observables, processed with different PDF sets

17 to 19 - question and discussion forum

A possible agenda of the school

Wednesday: Virtual correction day

Morning: 9 to 12 - introduction to detailed structure of NLO calculations relevant for interfacing LO MC and „Loop Engines“
- introduction to „Les Houches NLO accord“

Afternoon: 14 to 19

14 to 17 - computer exercises on how to use interface event generator to „Loop Engines“ for a simple example process

17 to 19 - question and discussion forum

Thursday: Real correction day

Morning: 9 to 12 - introduction to structure of subtraction formalism and
- to tools for matching PS and ME in NLO

Afternoon: 14 to 19

14 to 17 - evaluation of real and virtual corrections for specific processes

17 to 19 - question and discussion forum, quiz?

Eventually : 20 School Dinner

Friday: Conclusion Day

Morning: 9 to 12 - discussion forum, quiz reward, some elusive final lecture

Some first organisational issues

- date: autumn 2010 before teaching period starts
  avoid overlap with Maria Laach, BND school, ATLAS-D, CMS-D meetings, …

- organisational issues:
  - programm committee:
    - selection of topics and inviation of speakers
    - which tools to discuss in more detail and to use in exercises (CASCADE, HELAC, HERWIG, SHERPA, WHIZARD,…)?
    (local experts in FR + AC core members + MC network?)

  - financial support: how much from PBA + what is typical school fee?
  - infrastructure: lecture hall + several seminar rooms and IP pools for sixty participants available in FR
  - no use of experiment specific software
  - …..

The Analysis Centre is the organiser with support from Freiburg.
Profit from AC expertise in organisation over the last two years.