



Les Houches Workshop Series "Physics at TeV Colliders" 2013 Session: 3-21 June

LES HOUCHES



Introduction and Welcome The Organisers



SESSION I



VICTIM OF OUR WON SUCCESS APOLOGIES FOR THOSE WHO CAN NOT ATTEND

In 1999 about 65 participants over 12 days, 1 session

2001 -> 85, 12 days

2003 -> ~100 12 days

2005, 2 sessions 170 people, 3 weeks



2007, more than 300 applications! could not accommodate everyone,
two sites,

2009 about the same as in 2007! One site: The Centre

2011: more than 250 applications

2013: about the same as in 2011

Aim and Format of the Workshop

Les Houches 2013	 Home ▶ Les Houches 2013	
Working Groups	Aim and Format of the Workshop	
Wiki	Aim and Format	Page 1 of 3
Programme in LH	<p>This Workshop is the eighth in a series whose aim is to bring together theorists and experimentalists working on the phenomenology of TeV colliders. The emphasis in this series of workshops has been on the physics at the LHC and the Tevatron. The highlight of the 2013 Les Houches Edition is that for the first time in this series we will have plenty of data. With this much data, following the discovery of a Higgs-like particle, one aim of this Workshop is how to best sharpen our tools and techniques in order to reconstruct the profile of this particle and possibly uncover New Physics. An equally important aim is to reassess some of the still open fundamental questions in the light of this discovery and investigate which kind of New Physics such a particle may be hinting at.</p> <p>In view of the above considerations, the Workshop will devote particular attention to:</p> <p>(i) Higgs physics, and how it shapes our view on the mechanism of electroweak symmetry breaking; (ii) related searches for New Physics and (iii) progress in new techniques for the calculations and simulation of Standard Model processes.</p> <p>The Workshop will address issues such as how to best exploit these data as well as how to prepare for future LHC data, and what is most desirable in LHC upgrades. These activities will be conducted in close connection with the development and improvements of related theory tools, in particular of Monte-Carlo event generators.</p> <p>The Workshop runs over one year, including two meetings in Les Houches in the month of June, and exchanges and collaborations before and after the meetings. The meetings in Les Houches will consist of two sessions:</p>	<ul style="list-style-type: none">• Aim and Format of the Workshop• WG Topics• Coordination with other Workshops• All Pages
Photos and Videos		
Organising Committee		
News		
Practical Info		
Contact, Secretariat		
Proceedings: Templates and Instructions		
Freeman Dyson in LH		
LH PhysTeV Series		
Previous Sessions		
 Search		
Session I: 3-12 June 2013 with emphasis on SM-related issues		

Session 1: 3-12 June 2013

Main topics are progress in NLO multi-leg calculations and techniques, and NNLO computations. More generally this session covers issues related to precision physics and better understanding of the background and of standard models processes, in particular their implementations in tools and Monte-Carlos (e.g MC vs. NLO connections). The importance of electroweak corrections is another example of topics to be addressed in this session. Related to all these issues is the prediction and improvement of search techniques and methods as concerns the Higgs. Physics of jets, notably jet substructure, boosted objects and reducing uncertainties of binned jet predictions, will also be addressed in this session.

Higgs: SM Issues

Theory	Experiment
--------	------------

D. De Florian, Univ. Buenos Aires, Argentina

M. Kado (ATLAS), Orsay, France

Electroweak Contact: S. Dittmaier, Freiburg Univ., Germany

A. Korytov (CMS), Univ. Florida, Gainesville, USA

SM: Loops and Multilegs

Theory	Experiment
--------	------------

N. Glover, IPPP Durham, UK

J. Huston (ATLAS), Michigan State Univ., USA [Snowmass Contact](#)

Electroweak Contact: S. Dittmaier, Freiburg Univ., Germany

G. Dissertori (CMS), ETH Zurich, Switzerland [Liaison Session 1<->Session 2](#)

Tools and Monte-Carlos

Theory	Experiment
--------	------------

F. Krauss, IPPP Durham, UK

J. Butterworth (ATLAS), Univ. Coll. London, UK

MC-NLO Contact: K. Hamilton, CERN, Switzerland and Univ. Coll. London, UK

Jets Contact: G. Soyez, SPHT-CEA Saclay, France

General List of Topics

Since we expect quite a lot of overlap between the working groups we list here the different topics to be discussed in Session 1.

List for Session 1

1) Higgs-related

- a) PDF uncertainties for gluon-gluon fusion
trace differences between CTEQ, MSTW and NNPDF to see if uncertainty can be reduced
- b) Acceptances and uncertainties of acceptances for Higgs ($gg \rightarrow \text{Higgs} \rightarrow WW/ZZ$)
- c) Higgs+jets cross sections
 - comparisons of @MC@NLO, Powheg MINLO, MEPS@NLO, HEJ, etc
 - comparisons of W/Z+jets with above (+LoopSim) as a testbed
 - revisit tag jets: hadronization uncertainties for high rapidity jets
- d) Higgs+jets uncertainties
 - new scheme for jet veto uncertainties using Higgs+0, Higgs+1 jet resummation
 - comparison of Higgs+0 jet resummation results
- e) Higgs+b's (ex: $VH, H \rightarrow bb$)

2) PDFs

- a)
 - impact of LHC data, current and future
 - how well do we know PDFs at high x \rightarrow implications for new physics
 - how Gaussian are high x PDF uncertainties, i.e. what would it take to be
- b) impact of/need for an LHeC
- c) combination of PDF sets
- d) impact of NNLO jet calculations

3) (N)NLO QCD + (N)NLO EWK

- a) wishlist of calculations \rightarrow review of what current exists \rightarrow input: what do
- b) study of the 'Sudakov Zone', ~ 1 TeV where EWK corrections may be comparab
- c) PDFs with QED corrections, photon PDFs, gamma-gamma processes

4) Binoth Les Houches Accord (BLHA)

LES HOUCHES SPIRIT IN ACTION

- Avoid succession of formal, *normal* talks

LES HOUCHES SPIRIT IN ACTION



- Avoid succession of formal, *normal* talks





Lectures....in a very informal style

CONTINUES EVEN IN THE BAR

CONTINUES EVEN IN THE BAR



ON THE GRASS

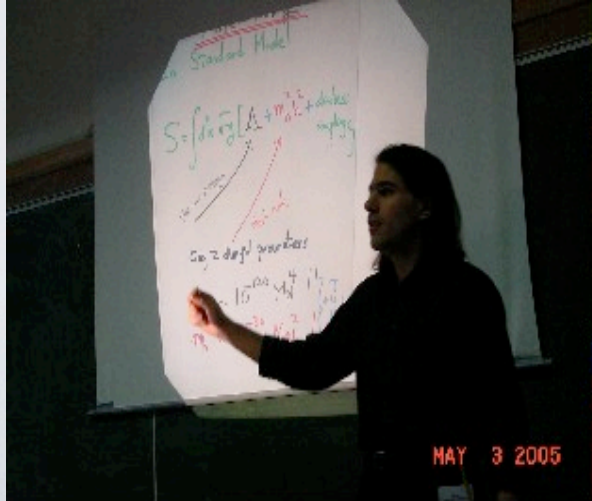
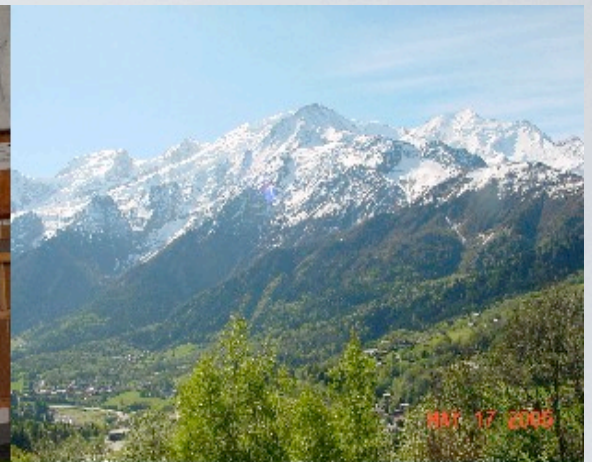


A LES HOUCHES ACCORD

IN THE MAKING IN

THE BAR





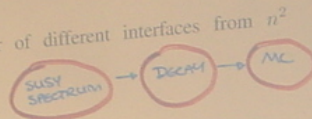
OKS

Les Houches 2003

B.C. Allanach

Les Houches Discord

- Les Houches 2001 accord between matrix element generators, Monte-Carlo programs
- Idea is to set same thing up between SUSY spectrum generators and other programs (co-ordinator: P Skands)
- Reduces number of different interfaces from n^2 problem to n
- long discussions
- At Les Houches 2003, then implemented one simple case (CMSSM); it **threw up** problems in the interface design
- Design principles: general structure which can be extended, conventions for particular case etc., higher loops very thorny



Homepage: <http://allanach.bcm.cern.ch/allanach/>

3

JUN 6 2003

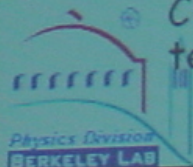
The *(original)* Les Houches Accords

HepUP Event Record

- Successful!
 - ⊗ Majority of MC talks at Les Houches mention it.
 - ⊗ Every ME/PS project that I've heard discussed in last 12 months uses it.
- Should extra info for ME/PS be included?
 - ⊗ No: generic information content is not yet established, everyone is trying new/different things. Still need max. freedom.
- Requests for a specified file format, -- but fear that forcing such a format would limit users.
 - ⊗ Tevatron uses FNAL MCFIO
 - ⊗ CERN MCDB using XML-like text files.

LHAPDF (structure functions)

- fewer users.
- evolves PDFs ... no long lookup tables
- Includes code==maintenance
 - ⊗ To be moved to Durham, maintained by Mike Whalley
- To do:
 - ⊗ Need to allow possibility of having many PDFs in memory at one time, to facilitate use of PDFs with uncertainties.
 - ⊗ Need access to:
 - Λ_s Λ_5 $c_{\text{threshold}}$ $b_{\text{threshold}}$ Q_{min} x_{min}
 - ⊗ allow for $p \rightarrow \gamma$ (need to include evolution)
 - ⊗ and other beam particles, π , ...
 - ⊗ Other smaller changes.
 - Map author strings onto integer
 - ⊗ Try to make everything backwards compatible.
- J. Huston to coordinate.



PROGRAMME

Programme and Planning updated daily, CONSULT the WiKi and
do the Wiki, Wiki



Trace: • start • programme

Les Houches

- Website
- Wiki
- Contact

2013 Session

- Home
- Programme in LH
- Participants Present in LH
 - Session 1
 - Session 2
- Working Groups Pages:
 - General List of Topics
 - Higgs
 - SM: Loops and Multilegs
 - New Physics
 - Tools and Monte-Carlos
- Conveners (Restricted Access)
- Participants (Restricted Access)

Previous Session

- 2011

Help

- How to: Latex, Tables,
- Wiki Manual

Programme in Les Houches

As is the tradition in LH, the programme will be built up on a daily basis. Until the meeting takes place, we can only list the programme of the first and last day of each session.

Files of the presentations should be appended. First upload your file through the media manager in the directory :2013:talks:

Session 1

Monday 3 June

19h30	Dinner	LH Restaurant
21h00	Conveners and Organisers Meet	Auditorium

Tuesday 4 June

09h00-09h15	General Intro and Welcome	Organisers	Auditorium
09h15-12h40	Working Group Summaries		Auditorium
09h15-09h50	NLO and Multileg, experimental	Joey Huston, Michigan State Univ.	Auditorium
09h50-10h20	N(N)LO and Multileg, theory	Nigel Glover, IPPP, Durham	Auditorium
10h20-10h50	Coffee Break		Lounge in Main Building
10h50-11h20	Higgs (Theory)	Daniel de Florian, Buenos Aires Univ.	Auditorium
11h20-11h50	Higgs (Experimental)	Andrey Korytov (Univ. Flo., Gainesville), Marumi Kado (LAL, Orsay)	Auditorium
11h50-12h30	Tools and MC	the WG Conveners	Auditorium

12h45-14h30	Lunch, Coffee, Sport, ...	LH Restaurant
-------------	---------------------------	---------------

Table of Contents

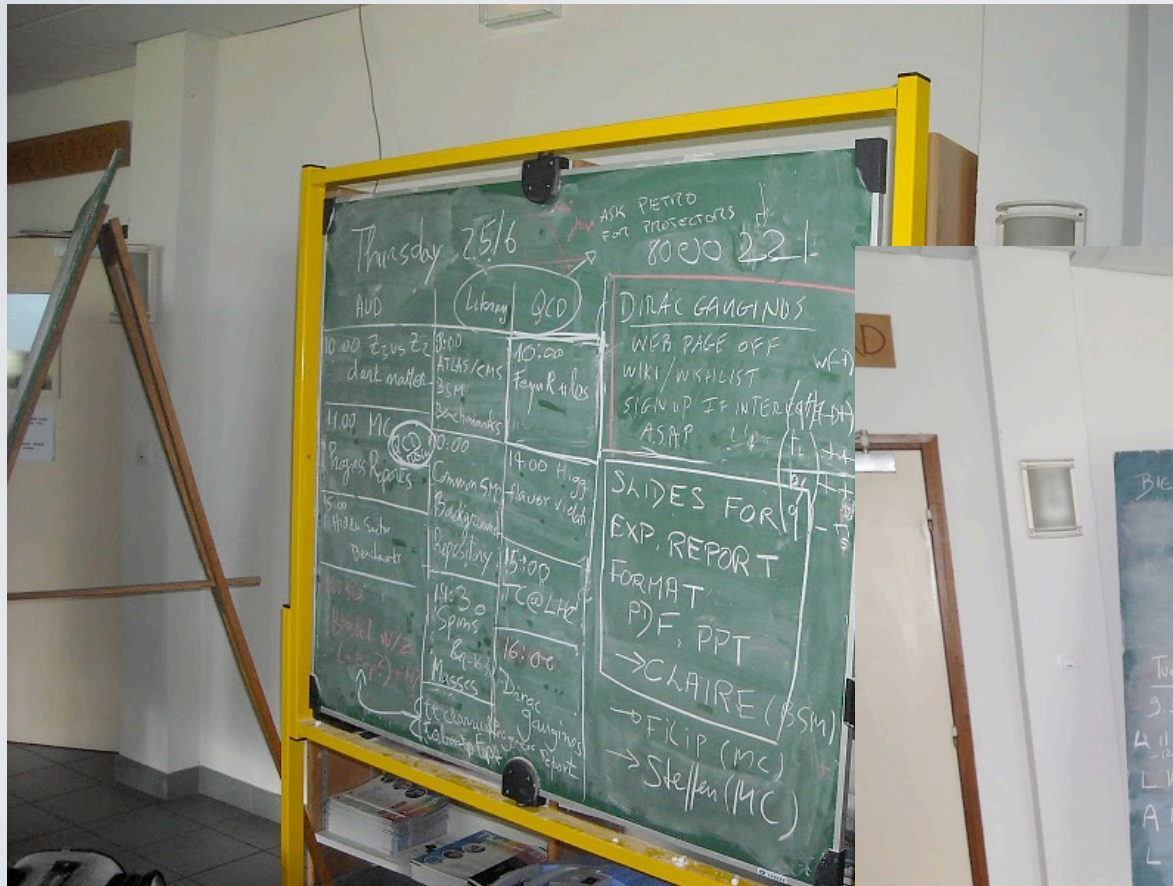
- Programme in Les Houches
- Session 1
 - Monday 3 June
- Session 1 Ends
- Session 2
 - 12 June
- Session 2 Ends

2013:programme



PROGRAMME

Programme and Planning updated daily, **see also the board in the entrance hall, outside the auditorium**





Les Houches

- Website
- Wiki
- Contact

2013 Session

- Home
- Programme in LH
- Participants Present in LH
 - Session 1
 - Session 2
- Working Groups Pages:
 - General List of Topics
 - Higgs
 - SM: Loops and Multilegs
 - New Physics
 - Tools and Monte-Carlos
- Conveners (Restricted Access)
- Participants (Restricted Access)

Previous Session

- 2011

Help

- How to: Latex, Tables,
- Wiki Manual

Tools and Monte Carlos

A list of topics common for sessions 1 and 2

- Data vs Theory (Tools and MC)
 - make use of Rivet→have Rivet tutorial early in workshop
 - dressed leptons: what is the best way of making comparisons between data and theory
 - more sophisticated looks at analyses with background subtractions
 - try to constrain jet content of UE
- **Update of LHE file format**; more information also [here](#)

A list of topics for session 1

- Schemes to systematically evaluate uncertainties in the new NLO tools
 - which scales to vary: standard renormalisation and factorisation scales in matrix elements
 - also in showers? if so, how?
 - starting scales of shower? how about contact to resummation calculations?
 - systematic variation of underlying event simulation: eigentunes? other ideas?
 - PDF uncertainties: how to do them properly in the shower? is this important?
- Comparison of NLO tools (continuation/extension of HiggsWG activity)
 - testcase: Higgs boson production in gluon fusion
 - inclusive quantities: Higgs pt, y distributions, Njets etc. & uncertainties
 - testing the high-pt regime
 - testing the two jet regime with weak boson fusion cuts
- Inclusion of ew corrections for TeV-scale processes
 - understanding the requirements for a systematic implementation
- Comparison of recent NLO matching/merging tools
 - review tools & techniques
 - highlight issues through example processes
 - aim for short write-up for non-experts on matching / merging, focusing on NLO merging, ending with roadmap for where further improvement is desired / necessary / not necessary.

A list of topics for session 2

- Proposal for a new event file format (to get rid of the huge stdhep and hepmc files)
- Extending the SLHA to include cross section information (automate event-by-event weighting with higher order cross sections)
- SMS decomposition: Libraries with simplified models, the associated analyses, LHC results as well as their implementation





Let me clear up some fog and snow

I am a Mass of
SNOW, but I ain't
SNOWMASS

**Coordination with
SNOWMASS and others**

MEETING AND DISCUSSION ROOMS: ALL WITH BLACKBOARD, VIDEO PROJECTORS

- Auditorium = 70 people
- QCD Room ~ 15 (20 max) →
- Library ~ 25-30



Reservation of video projectors, (slide projectors): See local organisers
JPG, FB, Eric P., Suzanne G.,

Seminar Room allocation: Reserve on the boards outside the
auditorium, or on the wiki

NETWORK & COMPUTING

- Had to set up a new network with servers from LAPP-LAPTh, but we still have to rely on the local infrastructure
- Please consult the leaflet we distributed
- For matters related to Server, Printers,...: See **Jean-Philippe**
- don't expect your usual internet connection speed when 40 people are on skype and others on yo

share





•



House & Home

Home

World

Companies

Markets

Global Economy

Lex

Comment

Arts ▼

FT Magazine ▼

Food & Drink ▼

House & Home

Style

Books ▼

Pursuits ▼

Travel ▼

Columnists

May 31, 2013 7:06 pm

The importance of a gizmo-friendly bathroom with WiFi



By David Tang

Should homes be redesigned to anticipate a changing world?
Excellent internet access is key

Sir David Tang, entrepreneur and founder of ICorrect, offers advice on questions about property, interiors – and modern manners for globetrotters

In view of the ever-changing internet world, should there be design elements for homes, whether newly built or not, to anticipate a changing world of living?

I would concentrate on the bathroom and make it larger and soften it with pieces of furniture and dispense with, as much as possible, all the hard surfaces like marble floors or tiling walls. The reason is because, increasingly, people are going to spend

EDITOR

VIDEO



Jane Ov
Flower S
annivers

MOST P

FOOD & DRINK(S)



- **Restaurant:**

- Lunch: 12.30 sharp, coffee (free) after lunch at the bar (below the restaurant)
- Dinner: 19.30. Try and Enjoy the local wines to make new friends. A jar of wine per table is part of the deal. More you pay.

- **Bar** open after dinner (count how much you drink, alcohol, beer included, not free)
- **Coffee and tea breaks:** please wash your cups. Soda not free, write your name on the list, settle bill before departure. (Espresso free?)
- **Lunch boxes:** order the night before)

- Today 18.30 Welcome Drink
 - The Centre Restaurant/Cafeteria
- Monday June 10th Workshop Dinner

OUTDOOR ACTIVITY

Don't get lost



OUTDOOR ACTIVITY



- Climbing, hiking, walks, maps: Jean-Philippe G

- weather permitting, Sunday is a “rest” day.

- Cycling: Eric P.

- Please inform at least one of the organisers, let them know where you are going, fill **the book in the hall**, give approximate time of when you'll be back

- It's a good idea to write

down your mobile phone number



Follow the guide



SECRETARIAT IN THE CENTRE

• Secretariat: fees, accommodation issues

Open from 8.45-12.30 & 13.30-17.30 (closed week end)

- **ALL of YOU** Please fill the info sheet (see your pigeon hole) and hand in to the secretariat as soon as possible
- Please pay your fees (non FP support)
- FP (those working in the French system): please leave the *attestation* in my pigeon hole
- All non FP will have to contact the Les Houches secretariat and pay the fees directly to them starting from 10 am today
- Ticket (pass) for the Chamonix Valley (buses and train): ask Secretariat

EMERGENCY NUMBERS

- Fawzi : +33 6 87 82 87 83
- Eric R. / Jean-Philippe +33 6 95 22 00 08
- Suzanne G. +33 6 63 55 90 60

HAVE A NICE WORKSHOP!!