

Tour de Table

HiggsTools Initial Training Network

1 - UDUR

✓ Full Partner

- Durham University (UDUR)

✓ Associated Partners

- University College, London (UCL)
- Imperial College, London (IC)

UDUR Team

✓ **Nigel Glover**

- Network Coordinator
- Supervisor of ESRs Juan Cruz-Martinez and Yacine Haddad



✓ **Frank Krauss**

- Node Coordinator
- WP3 leader, Research Board
- Supervisor of ESR Davide Napoletano



✓ **Michael Spannowsky**

- Supervisor of ESR Nicolas Gutierrez



UDUR - Team

- ✓ **Gavin Davies (IC - CMS)**
 - Supervisor of ESR Yacine Haddad

- ✓ **Jim Virdee (IC - CMS)**
 - Supervisor of ESR Yacine Haddad

- ✓ **Jon Butterworth (UCL - ATLAS)**
 - WP2 leader
 - Supervisor of ESR Nicolas Gutierrez



Events organised by UDUR



HiggsTools Kickoff Meeting

2-4 April 2014

University College London
Department of Physics & Astronomy
Gower Street
London
WC1E 6BT
<http://www.higgstools.org/>



First Young Researchers Meeting

Collaborative Teamwork and Communication

16 - 20 February 2015



Lumley Castle Hotel
Chester le Street
County Durham
DH3 4NX

"Coming together is a start.
Staying together is progress.
Working together is success."
Henry Ford

<http://www.higgstools.org/>



HC2015 Higgs Couplings 2015
Workshop to discuss the Higgs boson profile
- Mass
- SpinCP
- Couplings
- Structure
- BSM Higgs

Lumley Castle 12 - 15 October

Local Organisers: International Advisory Committee

Higgs + Jets

8-10 December 2014
IPPP Durham
Europe/London timezone



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Final Network Meeting and
Fourth Young Researchers Meeting 2017



2 - ALU-FR

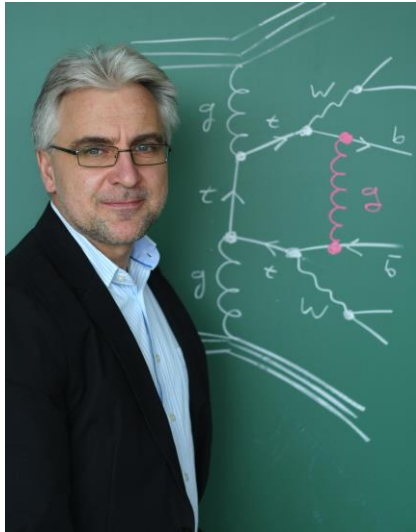
✓ Full Partner

- Freiburg University (ALU-FR)

✓ Associated Partner

- Max-Planck-Institut fuer Physik, Munich (MPI)

ALU-FR Team



**Stefan
Dittmaier**

Supervisor
of ESRs Michele
Boggia and Giulia
Gonella

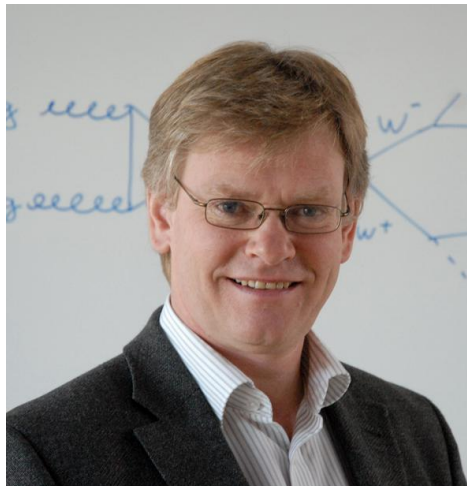
Recruitment team



Gudrun Heinrich
(MPI Munich)

Supervisor
of ESR Stephen Jones

WP2 leader



**Karl
Jakobs**

Supervisor
of ESRs Giulia
Gonella and
Theo Megy

Recruitment team



**Markus
Schumacher**

Supervisor of
ESRs Michele Boggia
and Theo Megy

Node coordinator

Events organised by ALU-FR

First Annual Meeting 15-17 April 2015
with public lecture by
CERN General Director Prof Heuer



Outreach:

Exhibition for the general public
„From Einstein to Higgs“
15-21 June 2015
Bürgerhaus Seepark (2000 Visitors)



M.S. Coorganizer of General Workshops of the LHCHXSWG at CERN
10th 15-17 July 2015 11th 13-15 January 2016



3 - CNRS

✓ Full Partner

- Centre National de la Recherche Scientifique (CNRS)

CNRS team



LAPTh (TH, Higgs BSM)

- ✓ G. Bélanger
 - Node coordinator

✓ F. Boudjema

✓ B. Herrmann

LPSC (TH, Higgs BSM)

- ✓ S. Kraml

LPTHE (TH, Higgs BSM, QCD)

✓ M. Cacciari

✓ P. Slavich

IPN-Lyon - CMS

- ✓ S. Gascon Shotkins

LPT- Orsay (TH, Higgs BSM)

- ✓ U Ellwanger
 - Supervisor ESR

M. Rodriguez-Vazquez

✓ A. Djouadi

✓ A. Falkowski

✓ Y. Mambrini

LAL - Orsay - ATLAS

✓ Lo Fayard

✓ Ly Fayard

- Training Board

✓ M. Kado

✓ R. Tanaka



Events organised by CNRS

Higgs Hunting
2014, 2015, 2016



Physics at TeV Colliders
Les Houches 2015, 2017

4 - DESY

✓ Full Partner

- Stiftung Deutsches Elektronen-Synchrotron (DESY)



DESY Team



Zeuthen

- ✓ J. Bluemlein
 - Node coordinator
 - Liaison to Maple/Wolfram
 - Training Board
 - Supervisor ESR Giulio Falcioni
 - TH, Heavy quarks, alphas
- ✓ I. Bloch
 - ATLAS, Detector Upgrades
- ✓ T. Naumann
 - ATLAS, heavy particles
- ✓ S. Riemann
 - ILC, heavy particles
- ✓ A. Behring
 - TH, Heavy quarks
- ✓ A. De Freitas
 - TH, Heavy Quarks
- ✓ P. Marquard
 - TH, top quarks
- ✓ T. Riemann
 - TH, Multileg processes

Hamburg

- ✓ G. Weiglein
 - WP1 leader
 - Supervisor ESR Shruti Patel
 - TH, Higgs BSM
- ✓ A. Raspereza
 - CMS, Higgs
 - Co-supervisor ESR Shruti Patel
- ✓ S. Moch
 - TH, alphas, PDF
- ✓ J. Reuter
 - TH, Higgs BSM, MC
- ✓ F. Tackmann
 - TH, Resummation
- ✓ K. Tackmann
 - ATLAS, Higgs
- ✓ S. Alekhin
 - TH, PDF, LHC



Events organised by DESY



- ✓ Third Young Researchers Meeting, Sep 2016, Zeuthen



Third Young Researchers Meeting

- ✓ Loops and Legs 2014, Weimar

- ✓ Loops and Legs 2016, Leipzig



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5 - DFTTO

✓ Full Partner

- Università degli Studi di Torino (DFTTO)

✓ Associated Partner

- Milano University, Milano (UNIMI)



DFTTO Team



DFTTO

- ✓ **G. Passarino (TH)**
 - Deputy Coordinator
 - Supervisor of ESRs Raquel Gomez-Ambrosio and Zahari Kassabov
- ✓ **C. Mariotti (CMS)**
 - WP1 leader
 - Supervisor of ESR Raquel Gomez-Ambrosio
- ✓ **D. Rebuzzi (ATLAS)**
 - recruitment committee (chair)
- ✓ **N. Amapane, M. Pelliccioni (CMS)**
 - WP1/WP2, thesis assistants
- ✓ **L. Magnea, E. Maina and S. Uccirati (TH)**
 - WP1/WP2/WP3, thesis assistants

UNIMI

- ✓ **Stefano Forte (TH)**
 - Co-supervisor of ESR Zahari Kassabov
 - WP3, PDFs
- ✓ **Leonardo Carminati (ATLAS)**
 - Co-supervisor of ESR Zahari Kassabov
 - WP1 and WP2



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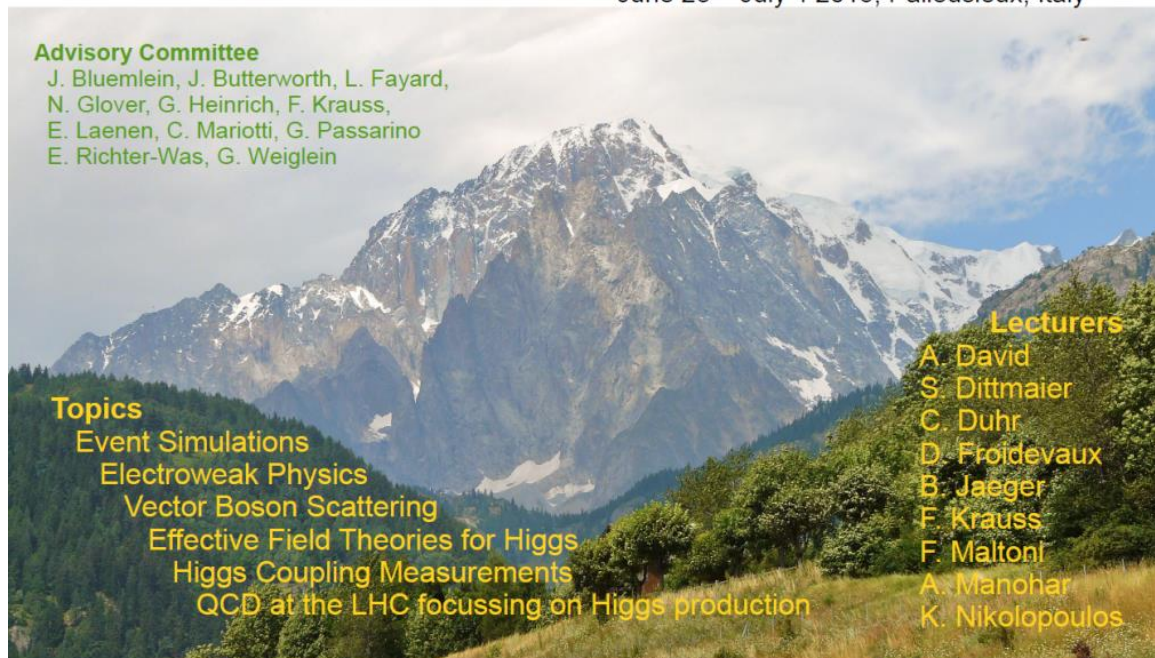
Events organised by DFTTO



- ✓ HiggsTools Summer School on Higgs Physics, Aosta, 2015

HiggsTools Summer School on Higgs Physics

June 28 – July 4 2015, Palleusieux, Italy



Advisory Committee
J. Bluemlein, J. Butterworth, L. Fayard,
N. Glover, G. Heinrich, F. Krauss,
E. Laenen, C. Mariotti, G. Passarino
E. Richter-Was, G. Weiglein

Topics
Event Simulations
Electroweak Physics
Vector Boson Scattering
Effective Field Theories for Higgs
Higgs Coupling Measurements
QCD at the LHC focussing on Higgs production

Lecturers
A. David
S. Dittmaier
C. Duhr
D. Froidevaux
B. Jaeger
F. Krauss
F. Maltoni
A. Manohar
K. Nikolopoulos

- ✓ Higgs Couplings 2014

- ✓ Third Annual Meeting 2017



<http://conference.ippp.dur.ac.uk/e/HTSS2015>



Third Annual Meeting



6 – ETH-Zurich

✓ Full Partner

- Eidgenoessische Technische Hochschule Zuerich (ETH-Zurich)

✓ Associated Partners

- University of Zurich (UZH)
- Paul Scherrer Institute (PSI)

ETH Team - 1

- ✓ **G. Dissertori (ETH Zurich):**
Node coordinator; CMS,
Supervisor of the ESRs Joosep Pata and Agnieszka
Ilnicka



- ✓ **S. Pozzorini (Univ. of Zurich):**
TH;
Co-Supervisor of the ESR Joosep Pata



- ✓ **M. Grazzini (Univ. of Zurich):**
TH;
Supervisor of the ESR Agnieszka Ilnicka



ETH Team - 2

✓ **M. Spira (PSI):**

TH;

Co-Supervisor of the ESR Agnieszka Ilnicka;

Co-organizer of the ZUOZ summer school



✓ **T. Gehrman (Univ. of Zurich):**

TH;

Co-Supervisor of ESR Juan Cruz-Martinez



✓ **A. Signer (PSI and Univ. of Zurich):**

TH;

Co-organizer of the Zurich PhD seminar 2015 and
of the ZUOZ summer school



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ETH zürich

PAUL SCHERRER INSTITUT



**Universität
Zürich** ^{UZH}



Events

- ZUOZ summer school 2016

- bi-annual international summer school (located in Zuoz, Engadin, Switzerland)
- internationally very renowned school
- the 2016 edition: **EXOTHIGGS**

- <https://www.psi.ch/particle-zuoz-school/>

- the topics covered will focus on Higgs physics and exotic models beyond the standard model

- main organizers from PSI, with members of the HiggsTools network and in particular of the Zurich node on the programme- and organising committee



7 - FOM

✓ Full Partner

- Stichting voor Fundamenteel Onderzoek der Materie (FOM)

✓ Associated Partners

- Universite Catholique de Louvain (CP3)



Eric Laenen

Theoretical Physicist at
Nikhef, Amsterdam

Supervisor of ESRs
Elisa Mariani and Tim
Wolf

Supervisory Board
Training Board, Liaison
to Shell



Stan Bentvelsen

Experimental physicist
Nikhef director

Supervisor of ESR Tim
Wolf



Fabio Maltoni

Theoretical physicist
Director of CP3

Supervisor of ESR Elisa
Mariani



Claude Duhr

Theoretical physicist at
CP3



Events organised by FOM/CP3

- ✓ Second young ESR meeting
 - Oct. 2015, F. Maltoni

Second Young Researcher Meeting

Other Events

- ✓ Technology and Instrumentation in Particle Physics (TIPP)
 - Amsterdam, Spring 2015
- ✓ Standard Model at the LHC (SM@LHC)
 - Amsterdam, Spring 2017

8 – IFJ-PAN

✓ Full Partner

- The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences (IFJ-PAN)

✓ Associated Partner

- University of Warsaw (UW)



IFJ-PAN Team



IFJ-PAN

- ✓ Z. Was (TH)
 - Node coordinator
 - Supervisor of ESR19
 - WP2/WP3
- ✓ E. Richter-Was (ATLAS)
 - WP3 leader
- ✓ P. Bruckman de Renstrom (ATLAS)
 - supervisor of ESR Marzieh Bahmani
 - WP1/WP2
- ✓ A. Kaczmarska (ATLAS)
 - WP1/WP2



Warsaw

- ✓ J. Kalinowski (TH)
 - WP2/WP3
 - supervisor of ESR Marzieh Bahmani
- ✓ W. Kotlarski (TH)
 - WP2/WP3
- ✓ M. Krawczyk (TH)
 - WP2/WP3
- ✓ S. Pokorski (TH)
 - WP2/WP3
- ✓ J. Rosiek (TH)
 - WP2/WP3



Redevelopment of ESR18

- ✓ Work package 2
- ✓ Task 2.2: Improved predictions for non-standard electroweak symmetry breaking scenarios
 - theoretical analyses of models of electroweak symmetry breaking
 - implementation into a MC code,
 - assessment of tau leptons as taggers of WL and Higgs parity
- ✓ Target:
 - Adaptation of precision calculations for vector boson scattering
 - Inclusion of non-standard Higgs boson scenarios, confrontation with experimental data
 - simulation of signal and background processes in a flexible way.
 - On technical side: participation in *TauSpinner* project and in its use (servicing in ATLAS)
 - Participation in work of ATLAS collaboration (MC modelling and charged Higgs searches).

- ✓ ESR18 career plan prepared. it includes:
 - precision calculations for WW scattering processes in alternative scenarios of electroweak symmetry breaking their implementation in and development of numerical tools
 - search for analysis strategies to enhance experimental sensitivity to possible deviations from the Standard Model expectations
 - modelling of tau leptons as taggers of WL.
 - optimisation of charged Higgs signal selection and estimation of the Standard Model backgrounds with the ATLAS detector at the LHC.
- ✓ Role as “trainee” for LHC activities
 - theoretical calculation and development of numerical tools for modelling the WW scattering processes and backgrounds.
 - implementation of numerical tools into software environment of LHC.
- ✓ Role as “trainer” for LHC activities
 - feasibility of applying proposed new tools within ATLAS or CMS;
 - understanding and interpretation of experimental measurements and limits.



9 – NCSR-D

✓ Full Partner

- National Center for Scientific Research
“Demokritos” (NCSR-D)



NCSR-D Team



✓ **Costas Papadopoulos (TH)**

- Node Coordinator
- Supervisor of ESR Hjalte Frellesvig
- Recruitment Team
- WP3 Task 3.2: Development and automatisisation of general next-to-leading order tools

National Technical University of Athens

✓ **G. Zoupanos (TH)**

- WP1 M1.3.1 Constraints on physics beyond the SM, distinction between different models

✓ **N. Tracas (TH)**

- WP1 M1.3.1 Constraints on physics beyond the SM, distinction between different models

University of Athens

✓ **V. Spanos (TH)**

- WP1 M1.3.1

✓ **A. Lahanas (TH)**

- WP1 M1.3.1

✓ **A. Dedes (TH)**

- WP1 M1.3.1
- WP2 M2.2.2 Precision calculations of non-standard Higgs boson scenarios

University of Sofia

✓ **E. Christova (TH)**

- WP1 M1.3.1
- WP2 M2.2.2



Events organised by NCSR-D



- ✓ "Corfu Summer Institute"
 - Sep 3 - Sep 14, 2014
- ✓ "Corfu Summer Institute"
 - Sep 1 - Sep 27, 2015
- ✓ "HOCTOOLS NNLO meeting"
 - 17-18 January, 2015

10 - UGR

✓ Full Partner

- Universidad de Granada (UGR)

✓ Associated Partners

- Instituto de Fisica Corpuscular, Valencia (IFIC)
- Instituto de Fisica de Cantabria, Santander (IFCA)



UGR Team Members



- ✓ **Roberto Pittau**
 - UGR, Node Coordinator, supervisor of ESR Davide Melini
 - WP2:M2.3.2;WP3:M3.2.1
- ✓ **Juan Fuster**
 - IFIC-Valencia and ATLAS-Valencia, , supervisor of ESR Davide Melini
 - WP1:M1.1.1,M1.2.1,M1.3.1;WP2:M2.3.1,M2.2.4
- ✓ **Sven Heinemeyer**
 - IFCA-CSIC-UC-Santander, will host ESR11
 - WP1:M1.3.1,M1.4.1;WP2:M2.2.3,M2.2.4

UGR

- ✓ **Francisco del Aguila**
 - WP1:M1.3.1
- ✓ **Juan Antonio Aguilar-Saavedra**
 - ATLAS
 - WP1:M1.3.1;WP2:M2.3.2
- ✓ **Fernando Cornet**
 - WP1:M1.3.1
- ✓ **Jose Ignacio Illana**
 - WP1:M1.3.1
- ✓ **Manuel Perez-Victoria**
 - WP1:M1.3.1
- ✓ **Jose Santiago**
 - WP1:M1.3.1



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Events related to HiggsTools

Second Annual Meeting

- ✓ "Higgstools second annual meeting"
 - **12.04. - 15.04. 2016** in Granada (<http://higgstools.org/>)
- ✓ "Higgs Days at Santander 2016"
 - 19.09. - 23.09. 2016 in Santander (<http://hdays.csic.es/HDays16/index.php>)

Other events

- ✓ "37th international conference on High Energy Physics"
 - 02.07. - 09.07. 2014 in Valencia (<http://ichep2014.es/>)
- ✓ "Workshop on Top physics at the LC 2015"
 - 30.06. - 03.07. 2015 in Valencia (<http://ic.uv.es/toplc15/index.html>)
- ✓ "Higgs Days at Santander 2015"
 - 14.09. - 18.09. 2015 in Santander (<http://hdays.csic.es/HDays15/index.php>)
- ✓ "Taller de Altas Energias 2015"
 - 20.09. - 02.10. 2015 in Benasque (<http://benasque.org/2015tae/>)

Associated Partners

✓ European Organization for Nuclear Research (CERN)

- ATLAS and CMS experiments



✓ Brook Lapping Productions Ltd. (Brook Lapping)

- Training in film making (First YRM)

✓ Waterloo Maple, Inc. (Maplesoft)



✓ Shell Technology Centre, Rijswijk (Shell)



✓ Wolfram Research, Inc. (Wolfram)

- All hosting ESR secondments



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The HiggsTools ESRs

