

BSM @ CERN TH

Andreas Weiler

Les Houches | CERN Theory retreat 11/2013

Outline

- Introduction
- Members
- Activities
- Self-introduction

What is BSM?

- Everything that's not the SM
- ... and has some hope to be tested with data
- ... and possibly resolves some of the open questions of the SM

“I do not mean to say that all these anticipations will withstand the test of experiment on the day such a test would become possible. Since he seeks in all directions one must, on the contrary, expect most of the trails which he pursues to be blind alleys.

But one must hope at the same time that one of the directions he has indicated may be the right one, and that is enough. This is indeed how one should proceed. The role of mathematical physics is to ask the right questions, and experiment alone can resolve them. ”

–Henri Poincaré’s letter of recommendation for A. Einstein, 1911

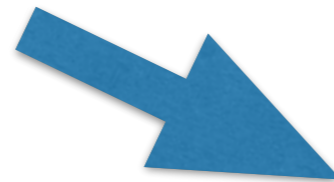
I AM A FLYING CAMEL PLEASED TO MEET YOU PLEASE IGNORE THE CRANE



model building

- What stabilises the Higgs?

$$\beta_{m_h^2} = \frac{dm_h^2}{d \log \bar{\mu}} = \frac{3m_h^2}{8\pi^2} \left(2\lambda + y_t^2 - \frac{3g^2}{4} - \frac{g'^2}{4} \right) \quad (\text{SM}) \quad M \gg m_h$$



$$\beta_{m_h^2} = \frac{dm_h^2(\bar{\mu})}{d \log \bar{\mu}} = \frac{y^2}{(4\pi)^2} (m_h^2 - 6M^2) + \dots$$

(SM + Dirac fermion)

- What is dark matter made of? Baryogenesis?
- Origin of flavour hierarchies? CPV ? Strong CP?
- Do couplings and matter multiplets unify?



phenomenology

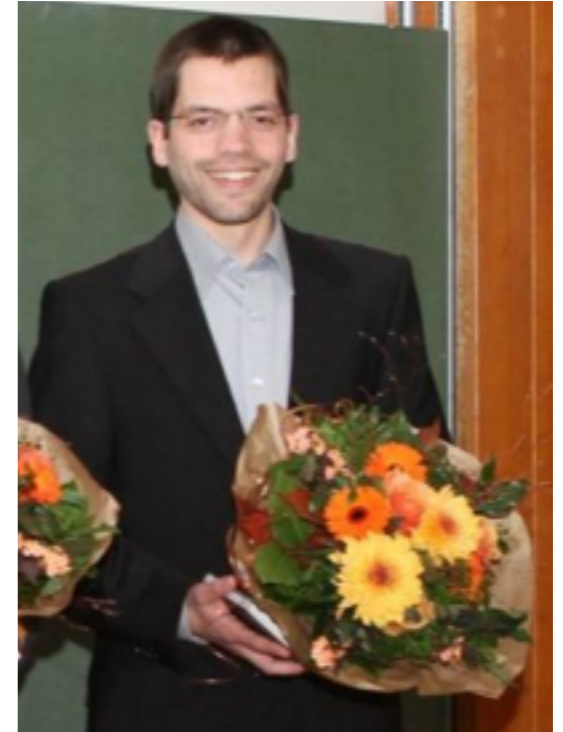
PhD students



Karen De Causmaecker
(CERN & Brussels U.)
13/14



Mikael Rodríguez Chala
(CERN & Granada U.)
13



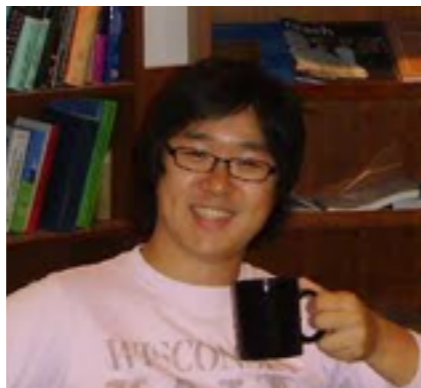
Matthias Schlaffer
(CERN & DESY)
from 1/14

+ many visiting (Maikel de Vries, ...)

New BSM Fellows



Monika Blanke
12



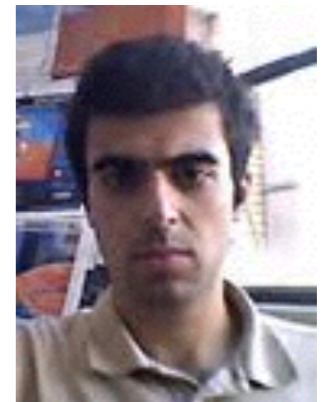
Ian Woo Kim
13



Daniel Stolarski
13



Kai Schmidt-Hoberg
12



Aleksandr Azatov
13



Jean-Francois Fortin
12



Pedro Schwaller
13



Michael Trott
11



Giuliano Panico
12



Chan Beom Park
12

Benjamin Fuks (12)

Cosmo/BSM: Matthias Garny (13)

Associates, frequent visitors, emeriti

- Witek Skiba
- Mariano Quiros
- Jonathan Feng (from 3/14)
- Abdelhak Djouadi
- John Ellis
- Guido Altarelli
- (many short term visitors)
- Alexandre Arbey & Nazila Mahmoudi
- Jose Espinoza
- **EPFLausanne**: Riccardo Rattazzi, Min-ho Son, Paolo Lodone, Rakhi Mahbubani

Staff



Roberto Contino
13



Gian Giudice



Gilad Perez
11



Andreas Weiler
13



Gian Giudice

(absent, Jaques Solvay chair until 11/30)



Last 5 papers:

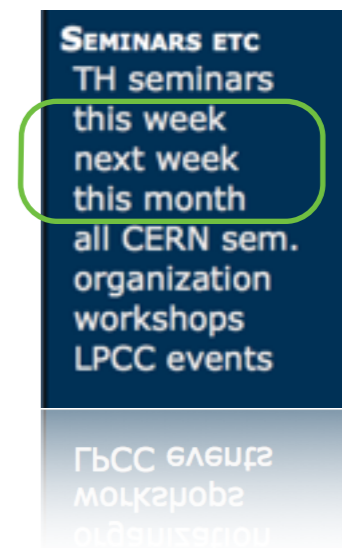
- ‘Naturalness after LHC8’
- ‘Investigating the near-criticality of the Higgs boson ‘
- ‘Flavoured Naturalness’ (-> talk by Monica)
- ‘The light stop window’
- ‘Testing new physics with the electron $g-2$ ’

Weekly activities

wwwth.cern.ch

Regular:

- Collider cross-talk: Thursdays at 11pm
- BSM lunches: Thursdays at 12:45pm
- BSM forum: Thursdays at 2pm
- TH colloquia: Wednesdays at 2pm



Other:

- Friday seminar at 2pm
- Workshops, TH institutes, Conferences, LPCC

lpcc.web.cern.ch



about me

- PhD->Cornell -> CERN -> DESY -> CERN
- Wednesday colloquium (assistance ~~mandatory~~ welcome),
BSM forum
- Future colliders (HL-LHC)

09:20

Gilad PEREZ 5'

09:25

Roberto CONTINO 5'

09:30

Daniel STOLARSKI 12'

09:42

Giuliano PANICO 12'

09:54

Aleksandr AZATOV 12'

10:06

Pedro SCHWALLER 12'

10:18

Kai SCHMIDT-HOBERG 12'

10:30

Coffee 30'

11:00

Jean-Francois FORTIN 12'

11:12

Monika BLANKE 12'

11:24

Ian-Woo KIM 12'

11:36

Chanbeom Park 12'

11:48

Michael TROTT 12'

12:00

Introduction to COSMO activities in TH 10'

12:10

Mathias GARNY 12'

12:22

Diego BLAS TEMINO 12'

12:34

Subodh PATIL 12'