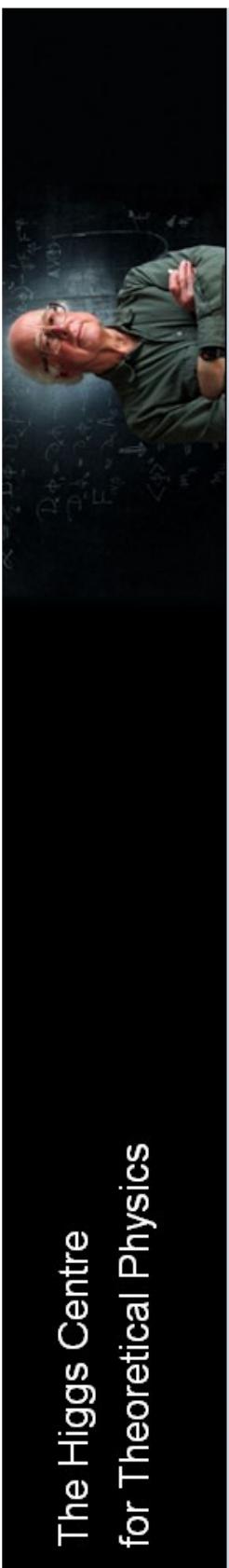


# The Higgs Centre for Theoretical Physics



[Home](#) | [About](#) | [Research](#) | [Colloquia](#) | [Workshops](#) | [Visitors](#) | [Graduate Studies](#) | [Recruitment](#) | [Higgs](#) | [Contact](#)

## Welcome

The discovery in July 2012 of a candidate Higgs boson at CERN, almost half a century after Peter Higgs' prediction in 1964, is a milestone in the history of theoretical physics. Rarely in the history of physics has a theoretical prediction been confirmed so spectacularly, so long after it was originally made.

This marks the start of a new era in theoretical physics. While the Standard Model of elementary particle physics is now complete, many fundamental questions remain unanswered. We still don't understand the intricate structure of charges and flavours in the Standard Model, nor what determines the values of its parameters. We are still struggling to build a compelling theory of quantum gravity, and understand the role played by the vacuum in the formation of the early Universe. We have no idea what dark matter and dark energy are, and we have difficulty understanding structure formation and complexity.

The Higgs Centre for Theoretical Physics has been established by the University of Edinburgh to seek answers to some of these questions, by creating opportunities for physicists and students from around the world to come together to formulate new theoretical concepts to take us beyond the limitations of current paradigms.

## Colloquia

**01.02.2013**

### Resummation

Speaker: **Eric Laenen**

Affiliation: NIKHEF and Amsterdam University

Location: CSEC seminar room,  
JCMB

Time: **13:00 to 14:00**  
[See All](#)

## Workshops

**09.01.2013 to 11.01.2013**

### The Higgs Symposium

Organisers: Richard Ball, Luigi Del Debbio, Eiran Gardi, Richard Kenway, Christos Leonidopoulos.

Venue: The University of Edinburgh, Informatics Forum, 10 Crichton Street, Edinburgh EH8 9AB

Key Speakers: John Ellis, Mikhail Shaposhnikov, Nima Arkani-Hamed, Michael Atiyah, Subir Sachdev ...  
[See All](#)

## The Higgs Symposium

The Higgs Symposium, organized by the Higgs Centre, will take place at the University of Edinburgh, 9-11 January 2013. The Symposium will consist of 12 plenary lectures, focused on the discovery of the Higgs boson and its impact on physics. Confirmed speakers include John Ellis, Mikhail Shaposhnikov, Nima Arkani-Hamed, Michael Atiyah, Subir Sachdev, Chris Llewellyn Smith, Howie Haber, Joe Incandela, Eilam Gross, Riccardo Rattazzi, David Kosower and Matt Strassler.

[Read More](#)

## Higgs Centre International Studentships

Two PhD studentships will be awarded this year by the Higgs Centre in the area of Theoretical Particle Physics. We seek candidates with a first class undergraduate degree (or equivalent), with good mathematical skills, who are strongly motivated to do research in quantum field theory and its application to particle physics. The starting date is September 2013. The studentships provide tuition fees, a stipend and a travel grant, for up to three and a half years. Applications from EU candidates are particularly encouraged.

[Read more](#)

James Clerk  
Maxwell  
Born



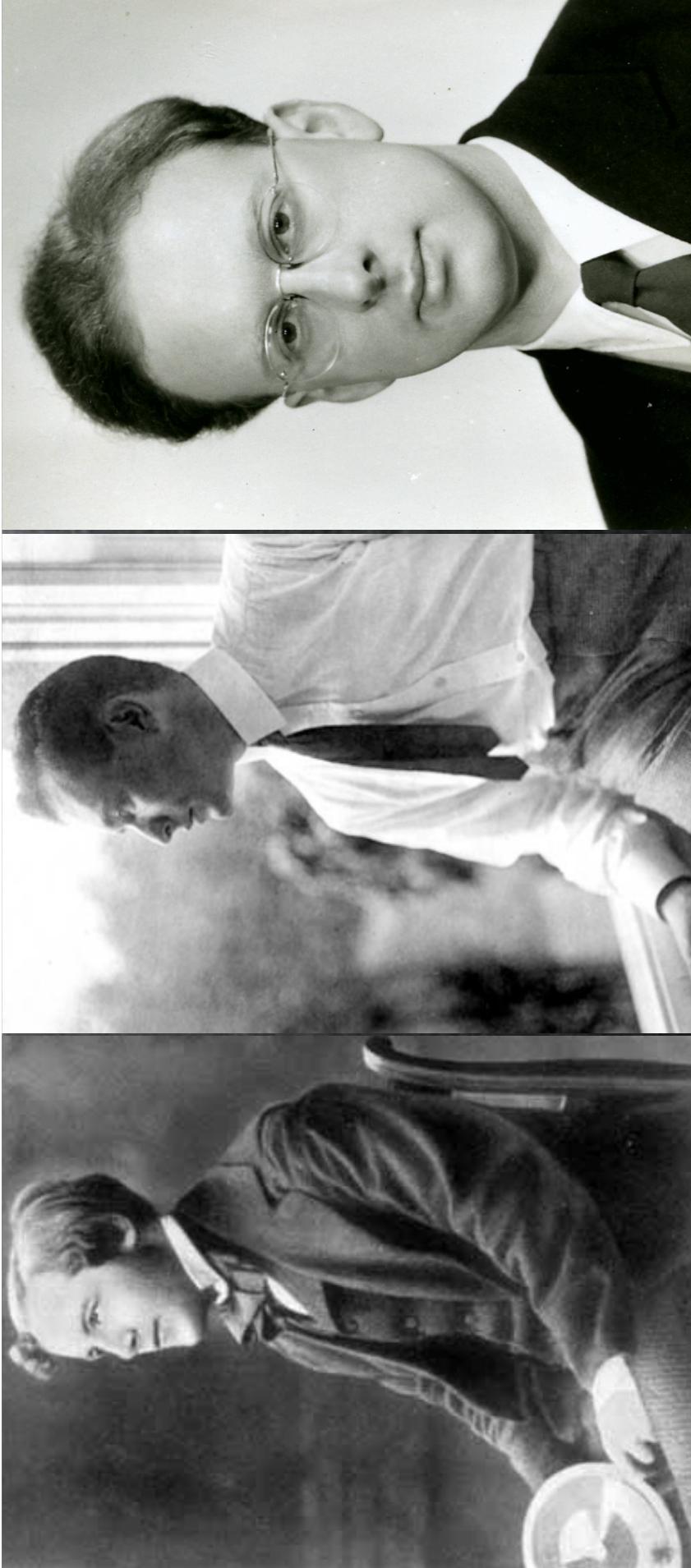
1847 - 1850

1936 - 1953

1960 - 1995

Peter  
Higgs





July 4, 2012

Higgs-like  
particle

$W^\pm$ ,  $\tau$   
Quarks

muon  
photon  
 $e^- \rightarrow$

1400

$$\mathcal{L} = (\partial_\mu \phi)^* D^\mu \phi - \frac{1}{4} F_{\mu\nu} F^{\mu\nu}$$

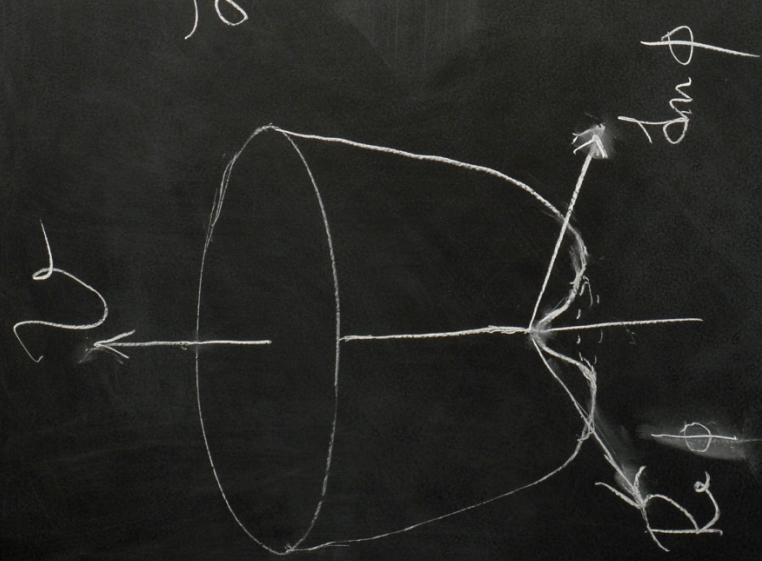
$$D_\mu \phi = \partial_\mu \phi - i g A_\mu \phi$$

$$F^{\mu\nu} = \partial_\mu A_\nu - \partial_\nu A_\mu$$

$$U(\phi) = \gamma \phi^* \phi + \beta (\phi^* \phi)^2$$

$$\gamma < 0, \quad \beta > 0$$

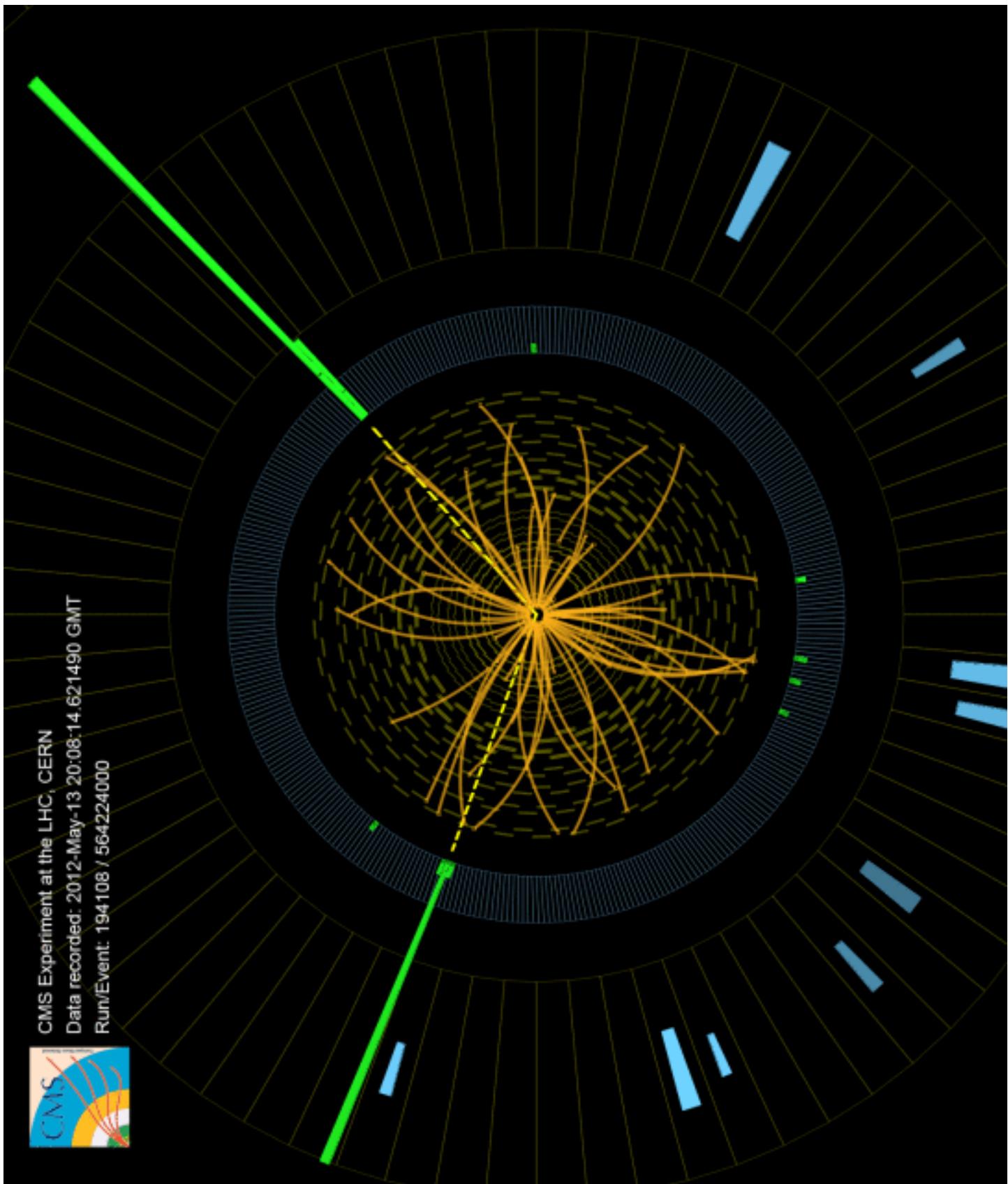
Peter Higgs

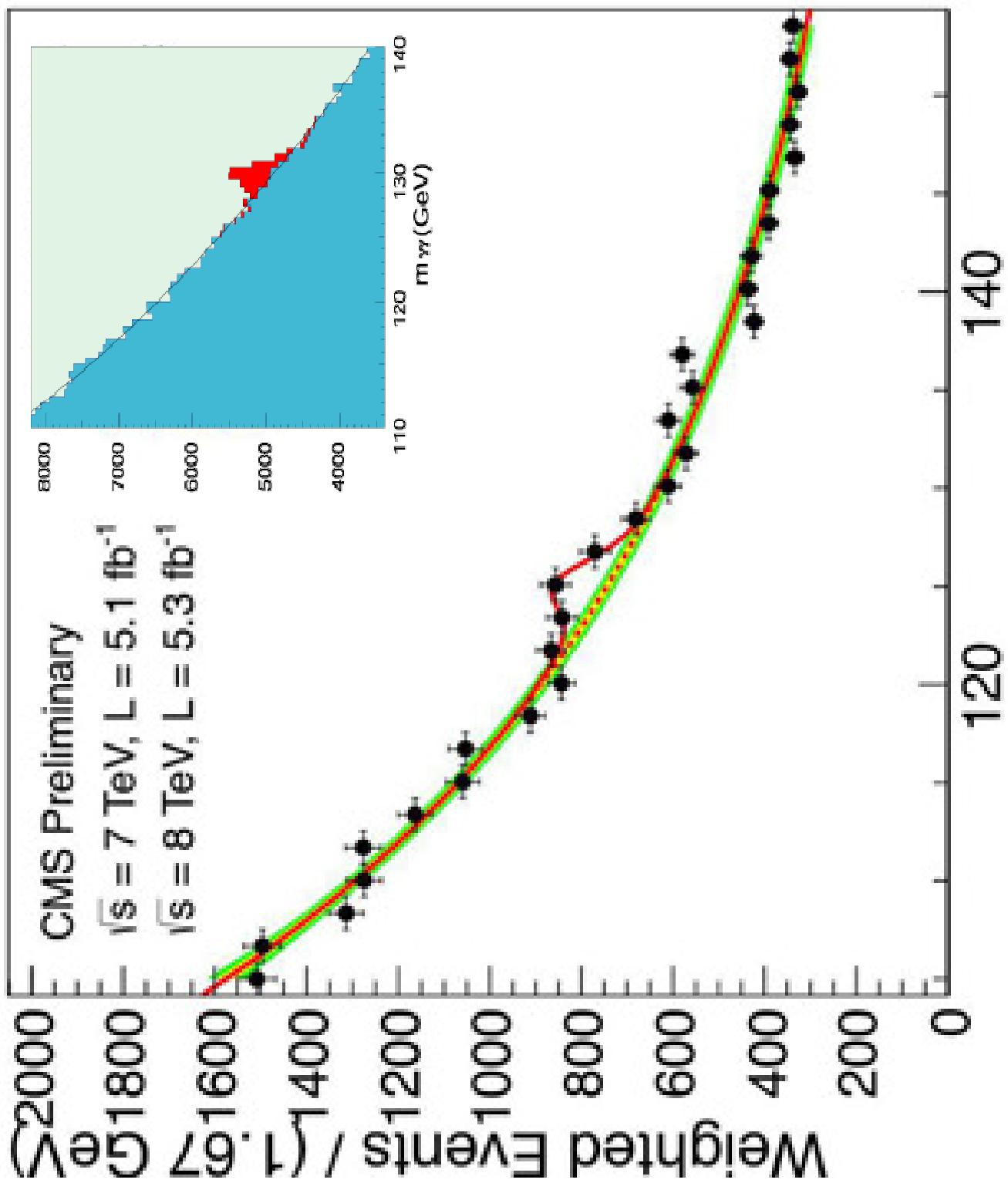


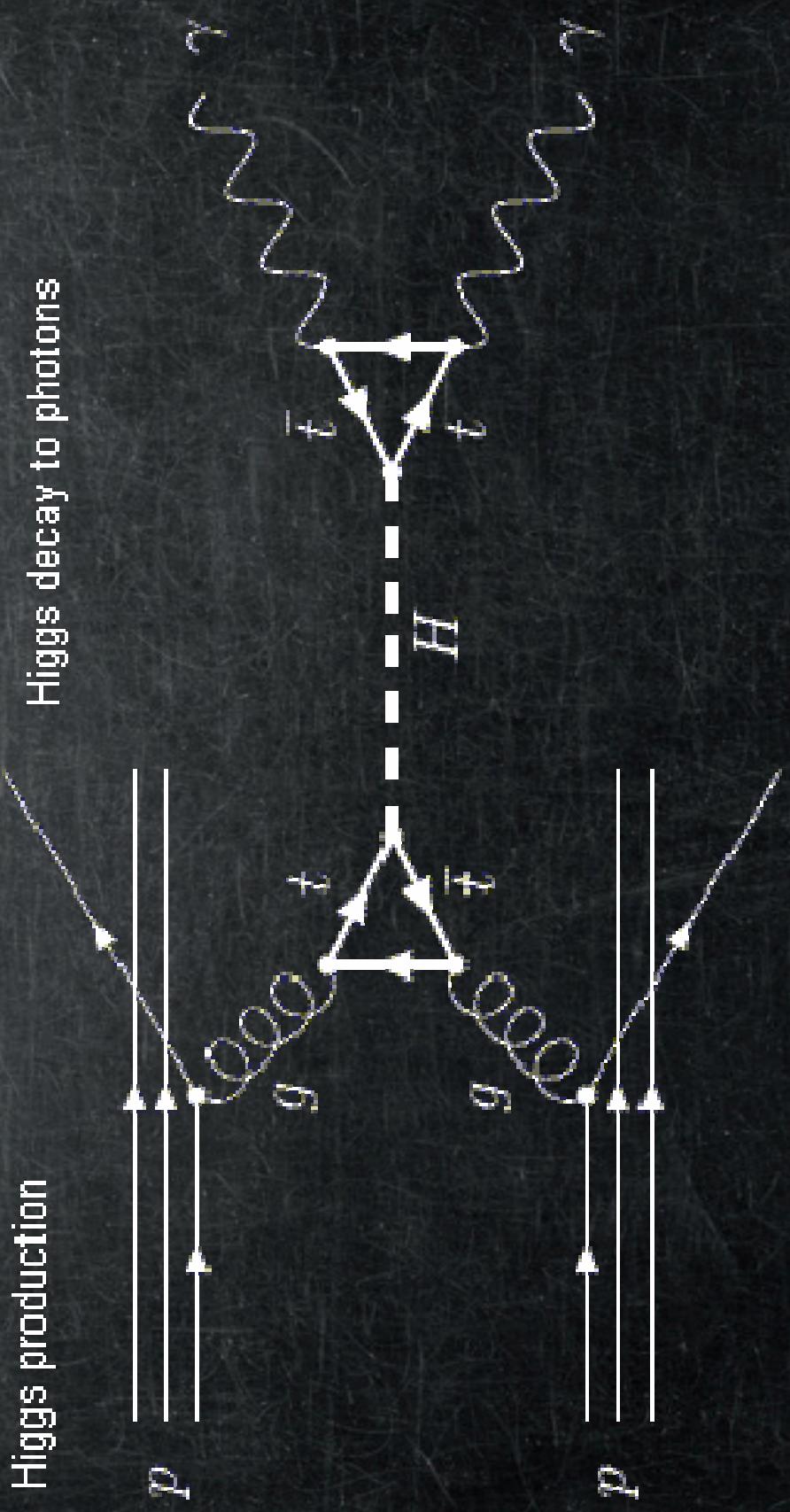




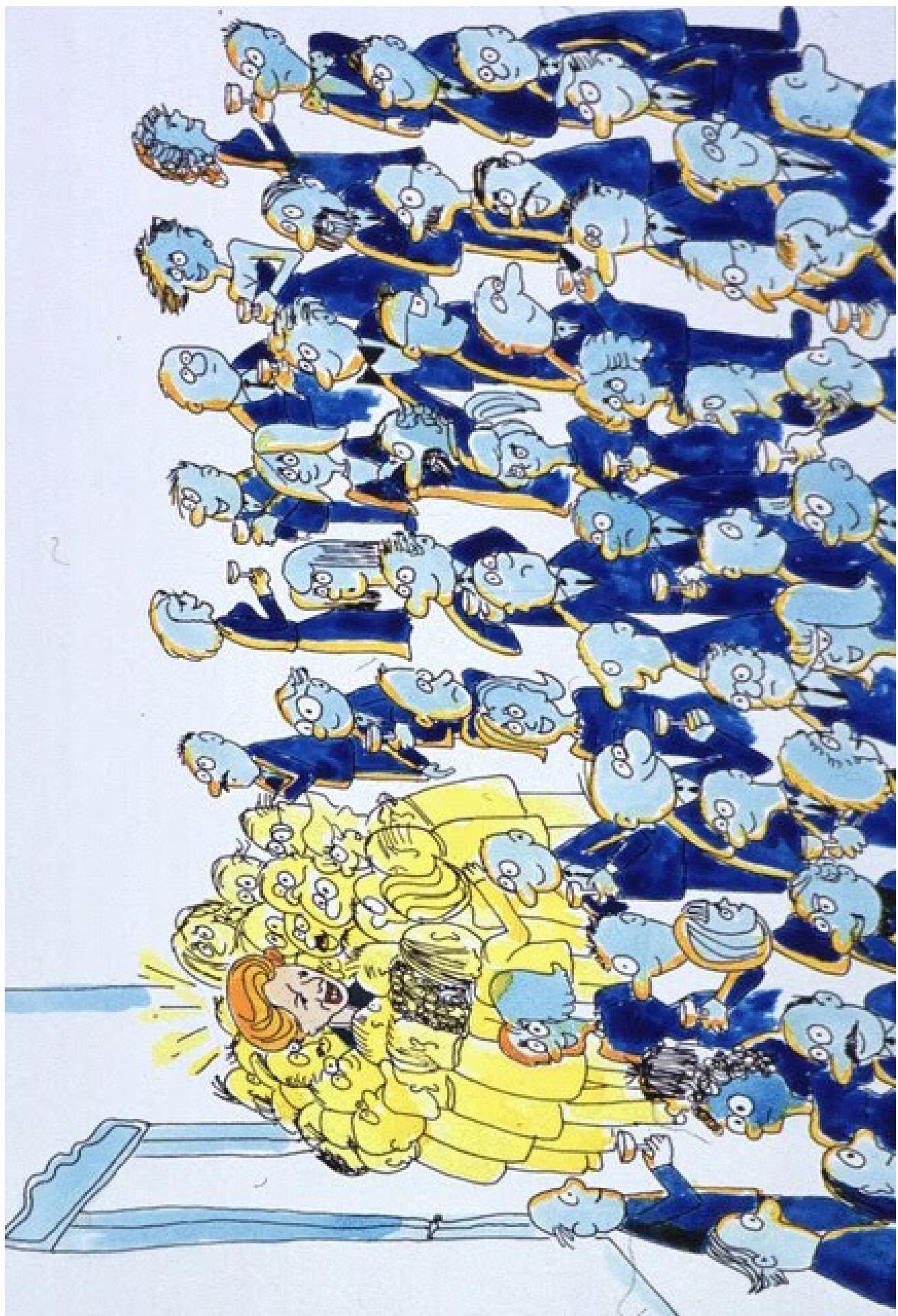
CMS Experiment at the LHC, CERN  
Data recorded: 2012-May-13 20:08:14.621490 GMT  
Run/Event: 194108 / 564224000











**WHEN THEY FINALLY  
DISCOVER THE  
HIGGS BOSON  
I WANT TO GET  
MY PICTURE  
TAKEN WITH IT.**





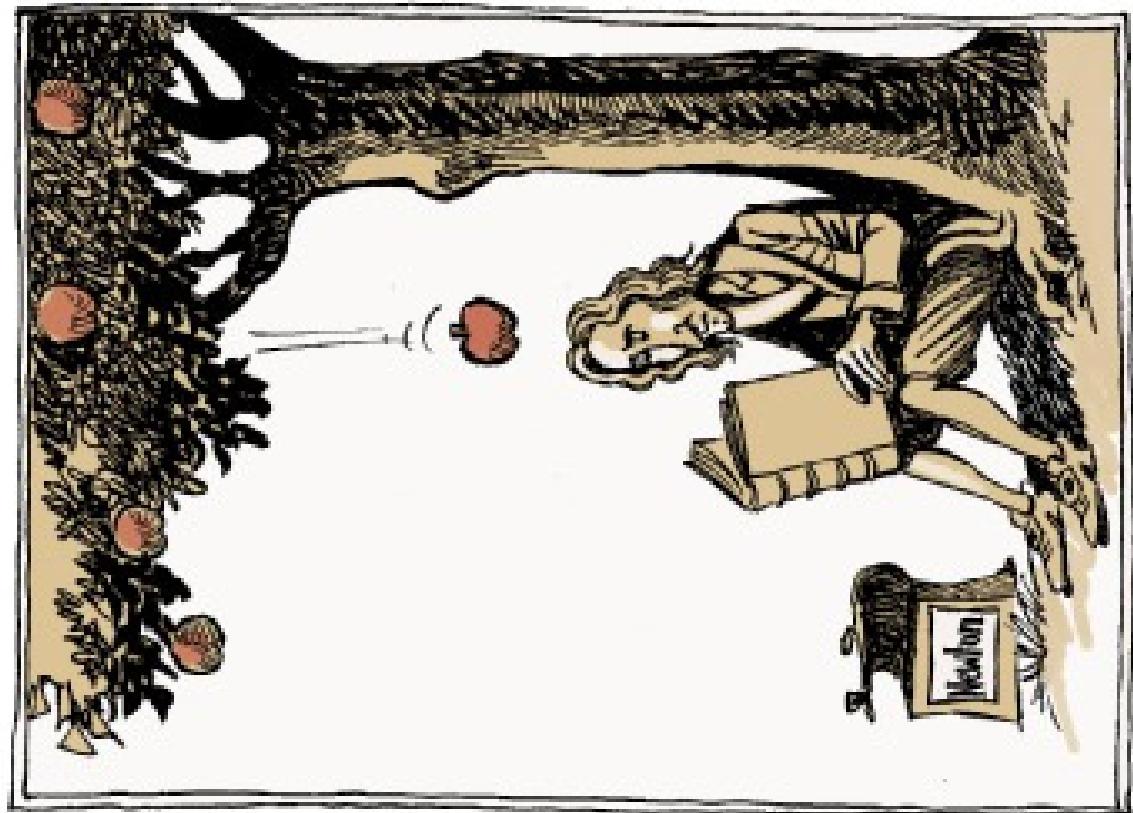
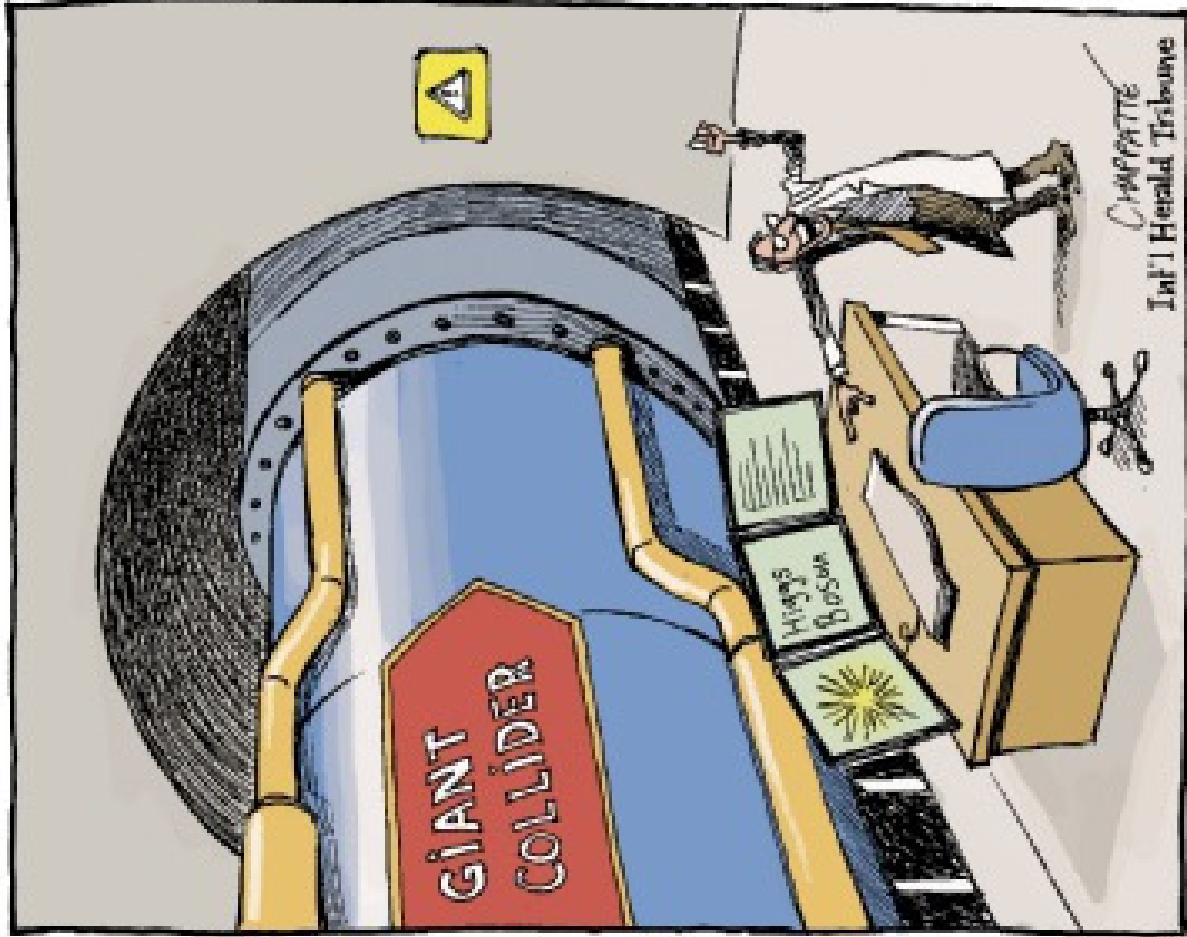
Portrait of Peter Higgs by Ken Currie, 2008.  
Displayed in the James Clerk Maxwell Building



**SAY GOD PARTICLE**

**ONE MORE  
GODDAMN TIME**

# Collisions That Changed The World





10 DOWNING STREET  
LONDON SW1A 2AA

THE PRIME MINISTER

13 July 2012

Dear Professor Higgs,

I would like to take the opportunity of CERN's historic announcement last week to congratulate and thank you for all you have done for British physics.

Your research papers of 1964, despite their initial rejection as being 'of no obvious relevance to physics' have underpinned the theories of particle physicists for decades now and their recent validation was a great triumph for you and the other theorists, illustrating the real knowledge gains that can arise from the seemingly obscure puzzles and mental exercises that theoretical physics explores.

The work of the engineers, experimentalists, theorists and computer scientists, many of them British, that has made the Large Hadron Collider a successful research facility has captured the imagination of the public at all levels and ages. The lead taken by yourself and other UK researchers has inspired much of the nation and will stimulate more young people to pursue scientific enquiry and training, providing the skilled work force upon which a modern economy like ours depends for growth. I know just by looking at the number of hits my comments about the announcement have had on the No.10 website how much this has captured the public imagination and interest.

Your research will form part of the UK's rich heritage in scientific advances and on behalf of the nation, I wanted to express my sincere thanks.

Yours sincerely,  
David Cameron

Professor Peter W Higgs



10 DOWNING STREET  
LONDON SW1A 2AA

THE PRIME MINISTER

13 July 2012

Dear Professor Higgs,

I would like to take the opportunity of CERN's historic announcement last week to congratulate and thank you for all you have done for British physics.

physicists for decades now and their recent validation was a great triumph for you and the other theorists, illustrating the real knowledge gains that can arise from the seemingly obscure puzzles and mental exercises that theoretical physics explores.

Recent activity has captured the imagination of the public at all levels and ages. The lead taken by yourself and other UK researchers has inspired much of the nation and will stimulate more young people to pursue scientific enquiry and training, providing the skilled work force upon which a modern economy like ours depends for growth. I know just by looking at the number of hits my comments about the announcement have had on the No.10 website how much this has captured the public imagination and interest.

Your research will form part of the UK's rich heritage in scientific advances and on behalf of the nation, I wanted to express my sincere thanks.

Yours sincerely,  
David Cameron

Professor Peter W Higgs



10 DOWNING STREET  
LONDON SW1A 2AA

THE PRIME MINISTER

13 July 2012

*Peter Higgs*

I would like to take the opportunity of CERN's historic announcement last week to congratulate and thank you for all you have done for British physics.

Your research papers of 1964, despite their initial rejection as being 'of no obvious relevance to physics' have underpinned the theories of particle physicists for decades now and their recent validation was a great triumph for you and the other theorists, illustrating the real knowledge gains that can arise from the seemingly obscure puzzles and mental exercises that theoretical physics explores.

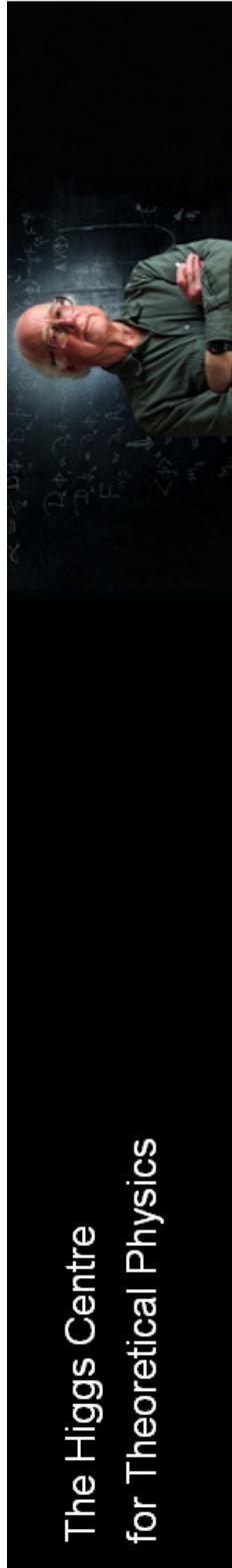
ages. The lead taken by yourself and other UK researchers has inspired much of the nation and will stimulate more young people to pursue scientific enquiry and training, providing the skilled work force upon which a modern economy like ours depends for growth. I know just by looking at the number of hits my

Your research will form part of the UK's rich heritage in scientific advances and on behalf of the nation, I wanted to express my sincere thanks.

*Theresa May*  
*DJG*

Professor Peter W Higgs

# The Higgs Centre for Theoretical Physics



[Home](#) | [About](#) | [Research](#) | [Colloquia](#) | [Workshops](#) | [Visitors](#) | [Graduate Studies](#) | [Recruitment](#) | [Higgs](#) | [Contact](#)

## Past Lecture Series      Graduate Studies

2011 (1)

2012 (1)

## Colloquia

01.02.2013

### Resummation

Speaker: Eric Laenen

Affiliation: NikHEF and Amsterdam University

Location: CSEC seminar room,

JCMB

Time: 13:00 to 14:00

[See All](#)



### MSc Programme Coordinators

#### Roger Horsley

Room: JCMB 4419

Tel: +44 (0)131 650 6481  
[rhorley@ph.ed.ac.uk](mailto:rhorley@ph.ed.ac.uk)

#### Brian Pendleton

Room: JCMB 4413

Tel: +44 (0)131 650 5241  
[b.pendleton@ed.ac.uk](mailto:b.pendleton@ed.ac.uk)

### PhD Programme Coordinator

#### Einan Gardi

Room: JCMB 4417

Tel: +44 (0)131 650 6469  
[Einan.Gardi@ed.ac.uk](mailto:Einan.Gardi@ed.ac.uk)

#### Apply for PhD

## MSc Programmes in Theoretical and Mathematical Physics

The Higgs Centre is launching MSc programmes in Theoretical Physics and Mathematical Physics. The main objective of these programmes is to introduce advanced ideas and techniques that are applicable in a wide range of research areas, emphasising the underlying physics concepts. Building upon our integrated Masters (MPhys) programmes and our graduate-level courses, the new MSc programmes will give students a solid foundation in theoretical and mathematical physics as a preparation for research in academia or industry.

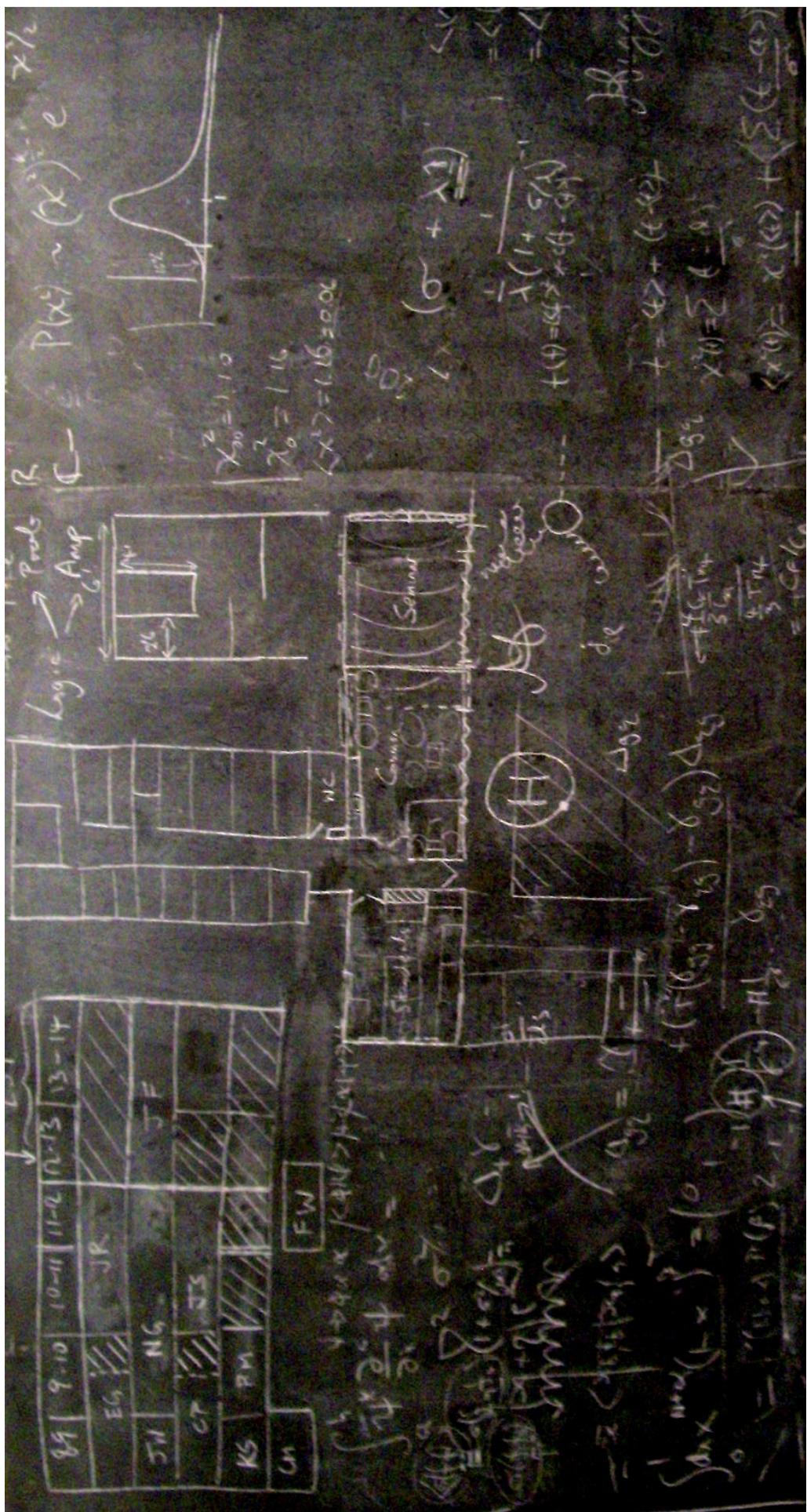
The MSc programmes are a core part of the Higgs Centre. Students on the MSc programmes are taught by members of the Higgs Centre, and over the summer they are involved in on-going research projects. MSc students take part in the Centre's activities, including weekly seminars, colloquia and workshops involving physicists from around the world.

## Workshops

09.01.2013 to 11.01.2013

### The Higgs Symposium

Organisers: Richard Ball, Luigi Del Debbio, Einan Gardi, Richard Kenway, Christos Leonidopoulos, Venue: The University of Edinburgh, Informatics Forum, 10 Crichton Street, Edinburgh EH8 9AB Key Speakers: John Ellis, Mikhail Shaposhnikov, Nima Arkani-Hamed, Michael Atiyah, Subir Sachdev ... [See All](#)

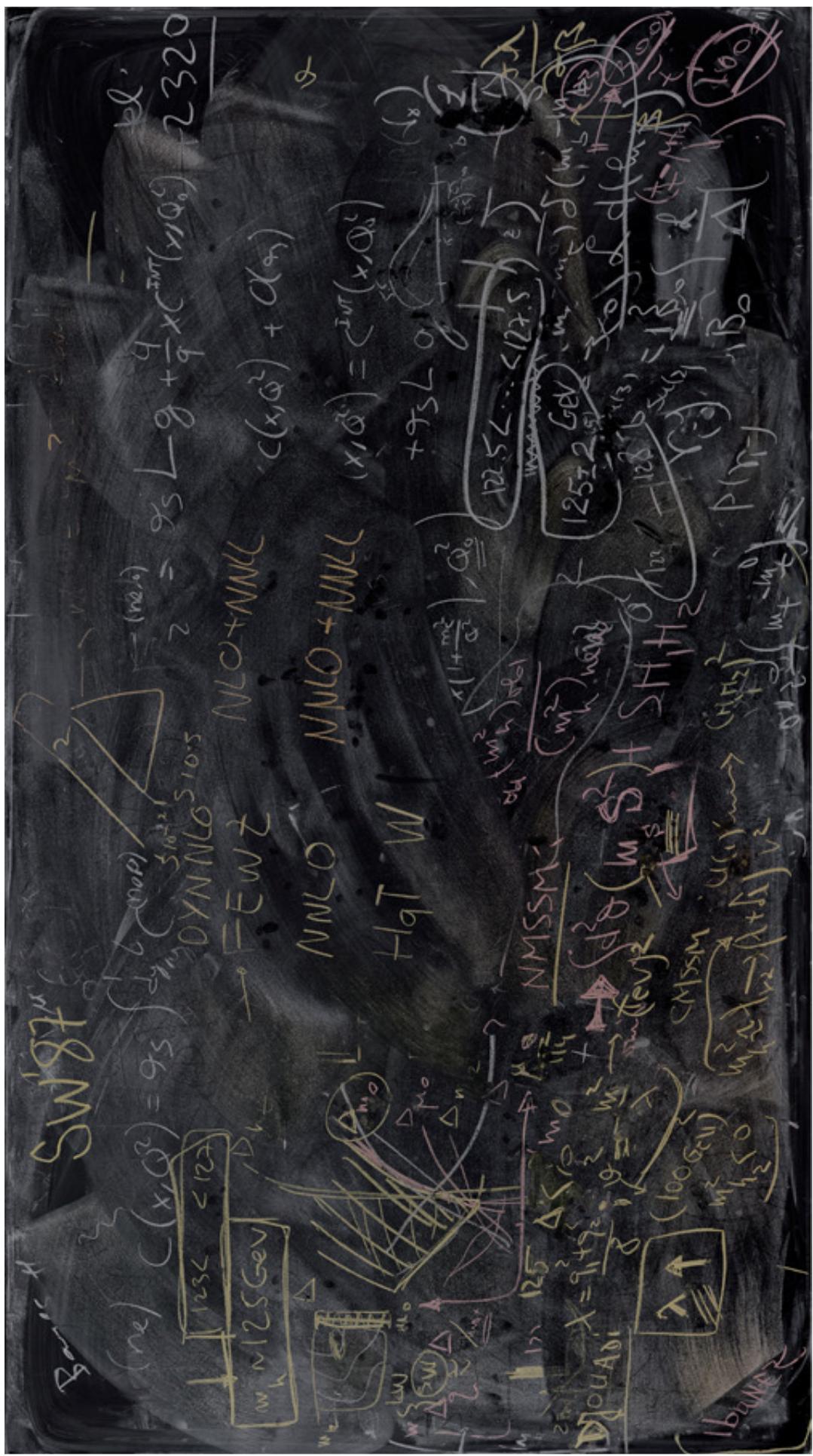


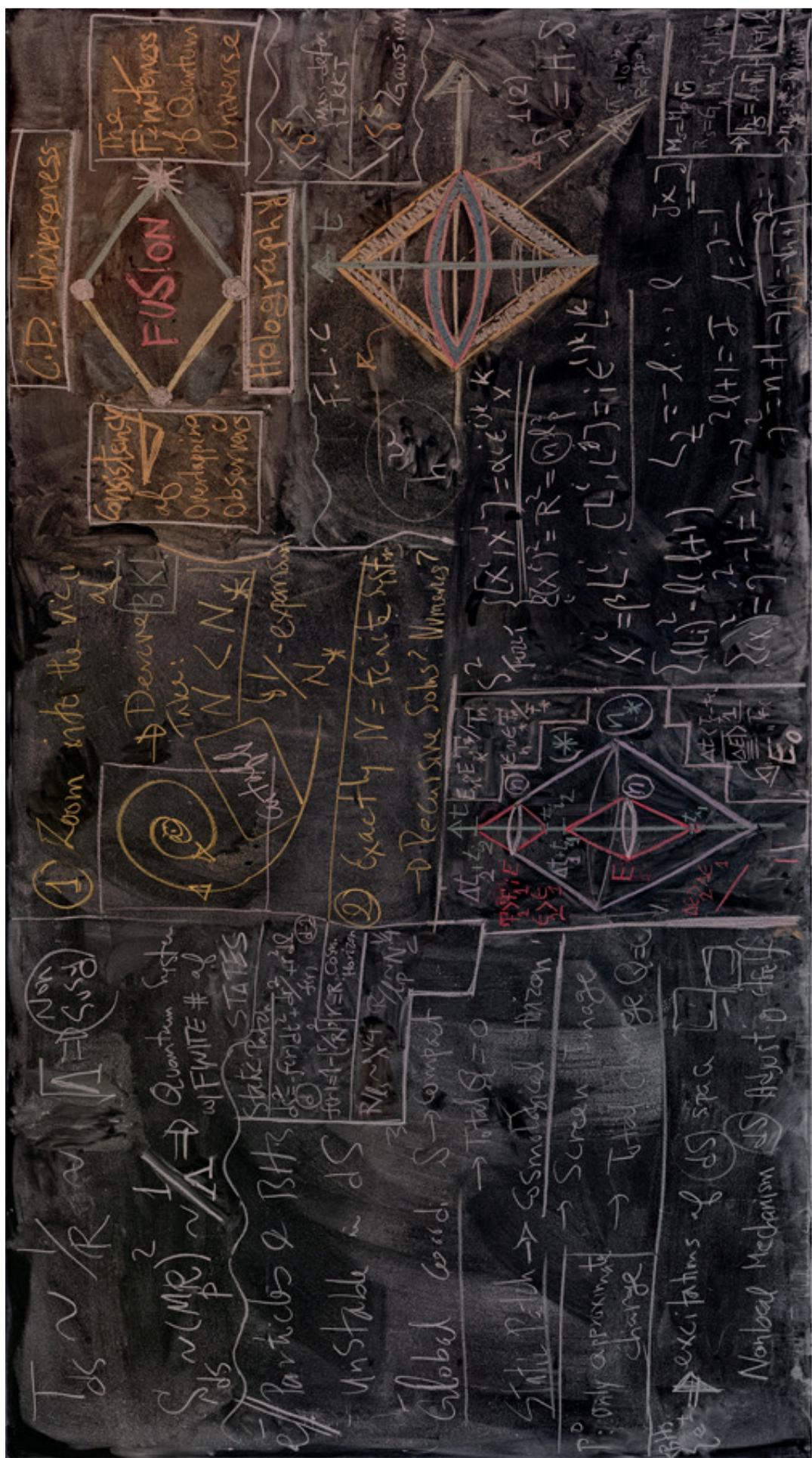
Alejandro Guillarro  
photography

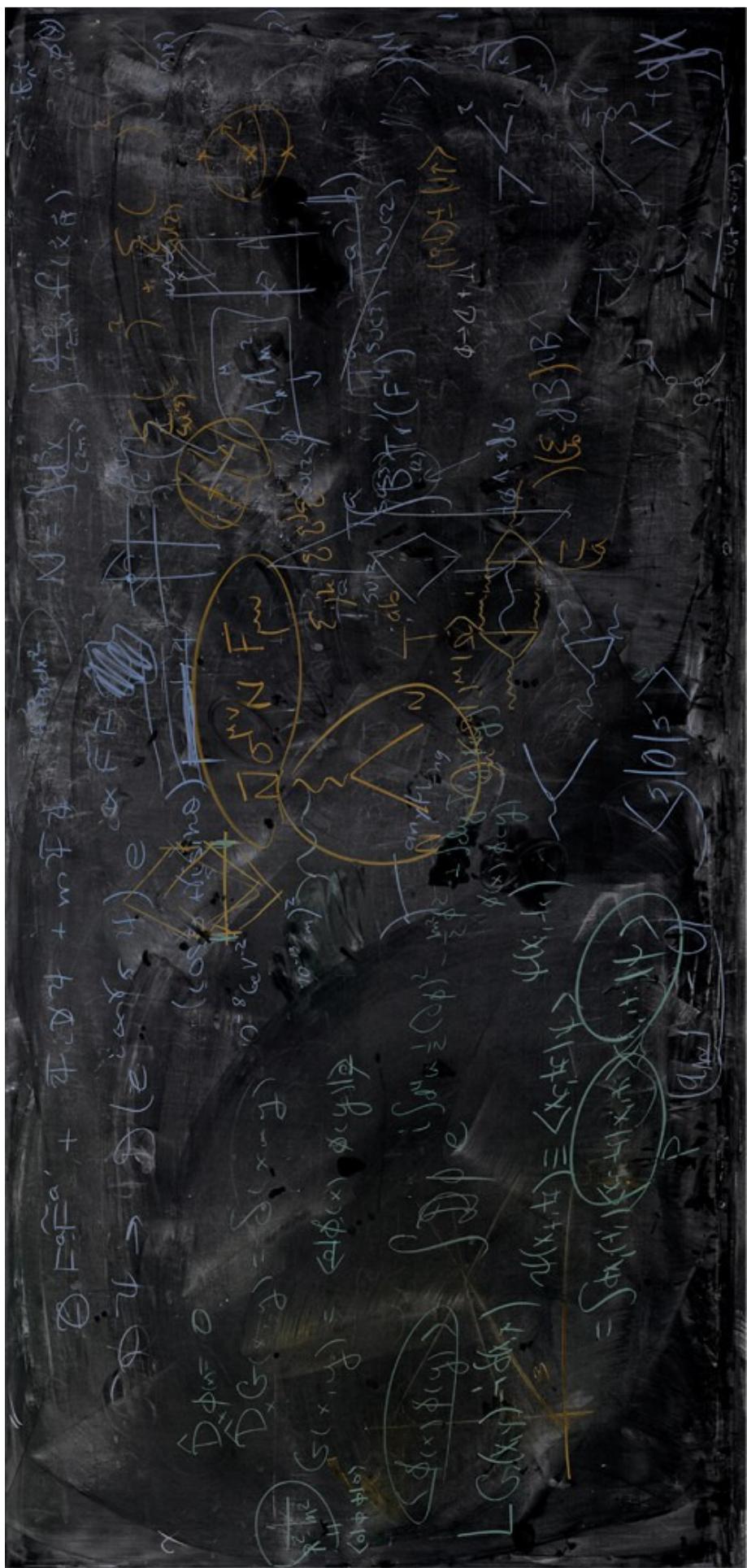


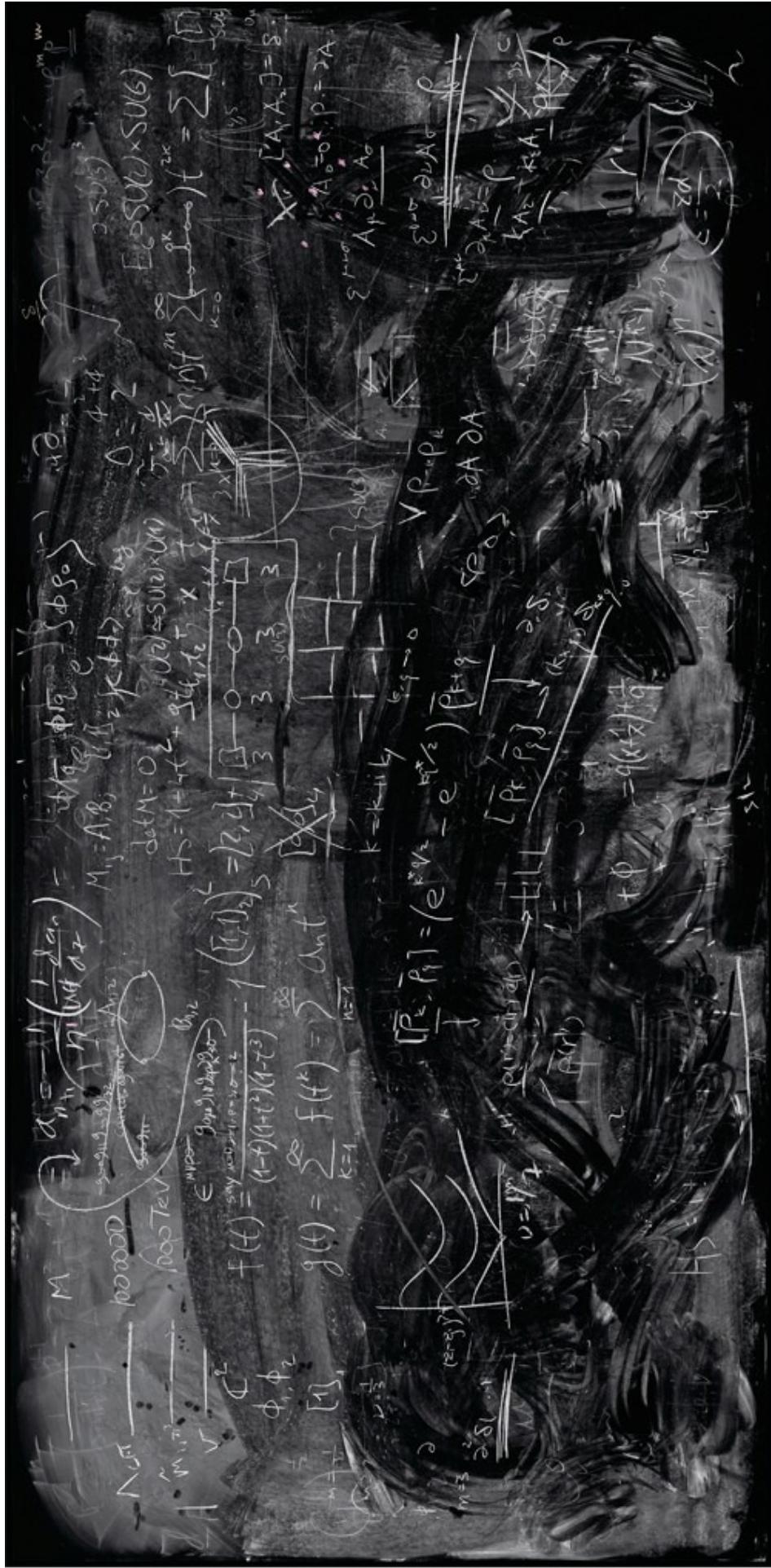
Tristan Hoare Gallery  
"Momentum"  
5th October - 30th November 2012, London

*“The artist travelled to the great quantum mechanics institutions of the world and, using a large-format camera, photographed blackboards as he found them. ‘Momentum’ displayed the photographs in life-size. Before he walked into a lecture hall Guijarro had no idea what he might find. He began by recording the blackboard with the minimum of interference. No detail of the lecture hall was included, the blackboard frame was removed and we are left with a surface charged with abstract equations. Effectively these are documents. Yet once removed from their institutional beginnings the meaning evolves. The viewer begins to appreciate the equations for their line and form. Colour comes into play and the waves created by the blackboard eraser suggest a vast landscape or galactic setting. The formulas appear to illustrate the worlds of Quantum Mechanics. What began as a precise lecture, a description of the physicist’s thought process, is transformed into a canvas open to any number of possibilities.”*











## **Wednesday January 9<sup>th</sup>**

- |                       |   |
|-----------------------|---|
| Chris Llewellyn Smith | Waiting for Higgs                       |
| Joe Incandela         | Higgs boson searches in CMS             |
| Eilam Gross           | Higgs boson searches in ATLAS           |
| Riccardo Rattazzi     | The Hierarchy problem and Compositeness |
| Michael Atiyah        | The Mathematics of Symmetry Breaking    |

## **Thursday January 10<sup>th</sup>**

- |                      |   |
|----------------------|---|
| Howie Haber          | A Higgs Hunter's Perspective                  |
| Mikhail Shaposhnikov | Higgs boson Mass and the scale of New Physics |
| Nima Arkani-Hamed    | Supersymmetry and the Higgs                   |
| David Kosower        | New Methods in Computational QFT              |
| Subir Sachdev        | From the Higgs particle to Holography         |

## **Friday January 11<sup>th</sup>**

- |                |                                   |
|----------------|-----------------------------------|
| Matt Strassler | Looking Beyond the Standard Model |
| Peter Higgs    | My Life as a Boson                |
| John Ellis     | The Higgs boson and beyond        |