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Johan Rathsman

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Resources

Discovery Packages

Contact

IPPOG – outreach activities and resources

Johan Rathsman, Lund University

Spaatind meeting, Skeikampen, 2012-01-02-07

- 1 The International Particle Physics Outreach Group (IPPOG)
- 2 International Masterclasses 2012
- 3 New IPPOG Outreach Database
- 4 Discovery Packages
- 5 Contact and more information



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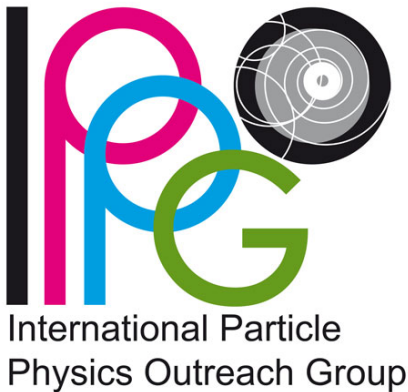
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Overall aim is to contribute to global understanding and appreciation of particle physics



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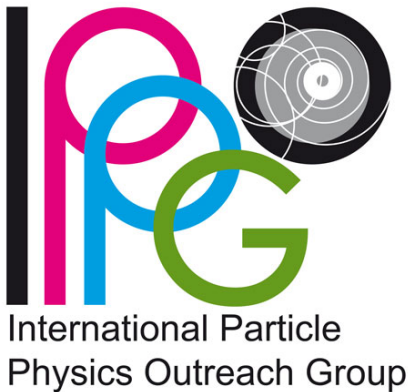
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Overall aim is to contribute to global understanding and appreciation of particle physics
– the *raison d'être* of every particle physicist!



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The International Particle Physics Outreach Group (IPPOG)

Who we are

- network of particle physicists, researchers, informal science educators and science explainers
- engaged in outreach and informal education for particle physics

Network Members

- one representative from each CERN Member State + USA
- representatives from DESY and CERN
- representatives from ATLAS, ALICE, CMS, LHCb

European → International in 2011

- Israel, KEK and TOTEM will be invited to join

formed in 1997 under the joint auspices of ECFA and EPS-HEPP



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Nordic representatives

- Denmark:  Rasmus Møller, Sankt Annae Gymnasium
- Finland:  Riitta Rinta-Filppula, CERN
- Norway:  Farid Ould-Saada, University of Oslo
- Sweden:  Johan Rathsmann, Lund University

Associate members

-  Maiken Pedersen, University of Oslo

In addition lots of people active in Masterclasses and other activities



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transition from <http://ippog.web.cern.ch/> . . .

to get info
on the member countries



The International Particle Physics Outreach Group (IPPOG)

The International Particle Physics Outreach Group is a network of particle physicists, researchers, informal science educators and science explainers engaged in world-wide outreach and informal science education for particle physics.

IPPOG's Aim

IPPOG's purpose is to raise awareness, understanding and standards of global outreach efforts in particle physics and general science by:

- » Providing discussion forums and regular information exchange for science institutions and labs engaged in global outreach and informal science education
- » Proposing and implementing strategies to share lessons learned and best practices for outreach in particle physics and general sciences
- » Promoting current outreach efforts of network members

Network Members

IPPOG is composed of

- » one member nominated by the particle physics community of each CERN Member State (normally the responsible person for outreach activities in the state concerned)
- » one member each from DESY and CERN, appointed by the managements of those laboratories
- » additional representatives from particle physics experiments, astroparticle physics and non-Member States of CERN

IPPOG was formed in 1997 under the joint auspices of the European Committee for Future Accelerators (ECFA) and the High Energy Particle Physics Board of the European Physical Society (EPS-HEPP Board).



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to a new website being developed



International Particle Physics Outreach Group

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[My account](#) | [Log out](#)

IPPOG and Global Learning Resources

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aenean non erat nec purus fermentum blandit. Nunc magna diam, mattis non tempor in, vulputate nec lorem. Integer pellentesque magna vel diam pellentesque vitae tempus quam venenatis. Nullam massa erat, dictum varius scelerisque id, egestas in eros.

Draw Me a Physicist

To raise school children's awareness of and enthusiasm for the world of physics and life as a physicist



Latest Resources / Featured



Particle Masses,...

To illustrate the importance of the specific particle mass values for our own existence

0 comments



Draw Me a Physicist

To raise school children's awareness of and enthusiasm for the world of physics and life as a physicist

0 comments



Presenting Science

To improve scientists' presentation and public speaking skills

2 comments

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[Media](#)
[Professional Development & Program Guides](#)



The Global Learning Resources is supported by the **CERN**. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec nec metus elit, sit amet viverra mi. Fusce sed enim eget turpis dictum hendrerit vel ac nibh





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also on facebook: <http://www.facebook.com/IPPOG>



Wall

Info

Discussions

Links

Photos

Events

About

Discovering particle physics together

39

like this

2

talking about this

Likes

See All



ALICE experiment



QuarkNet

Ippog-International Particle Physics Outreach Group



Education

Wall

Ippog-International Parti... · Everyone (Top Posts) ▾

Share: Post Photo

Write something...



Ippog-International Particle Physics Outreach Group

IPPOG talk at Como available at: <https://cms-docdb.cern.ch/cgi-bin/PublicEPPOGDocDB/ShowDocument?docid=295>

IPPOG-doc-295-v2: IPPOG talk for Como conference
cms-docdb.cern.ch

Use Indico for meetings, CDS for official papers, notes and photos and EDMS for engineering documents.

Like · Comment · October 4 at 10:54pm ·



Ippog-International Particle Physics Outreach Group

Steven Goldfarb giving an overview of the why, what, how etc. of LHC-related education and outreach





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What we do

raise awareness, understanding and standards of global outreach efforts in particle physics

- discussion forum and regular information exchange for outreach and informal science education
- share ideas as well as lessons learned and best practices for outreach
- provide support within each country for others engaged in outreach activities

Some examples

- Masterclasses
- Outreach database
- Discovery Packages



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INTERNATIONAL
MASTERCLASSES

hands on particle physics

General objectives

- opportunity for students (16-19) to discover particle physics
- get insight into topics and methods of basic research
- perform measurements on real LHC data (distributed on DVD)
 - W , Z and J/ψ from ATLAS/CMS and Λ , K^0 from ALICE
- participate in an international video conference for discussion and combination of results



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INTERNATIONAL
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hands on particle physics

General objectives

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This academic year

- February 27 to March 24, 2012, coordinated by TU-Dresden
- Each day up to six out of about 120 institutes will participate
- <http://physicsmasterclasses.org/neu/>



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<http://kjende.web.cern.ch/kjende/en/index.htm>



[HOMEPAGE](#)

[W-PATH](#)

[Z-PATH](#)

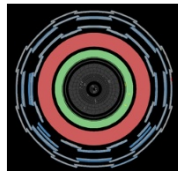
LHC@InternationalMasterclasses

Join us on a journey to the smallest pieces of matter! Learn what is happening 100 meters below the ground at the European Organization for Nuclear Research (CERN). In the Large Hadron Collider, with a circumference of 27 kilometres, the experiments ALICE, ATLAS, CMS, and LHCb are running. The following short video gives an impression of the start of a fascinating journey looking for the origin of mass, Dark Matter, and new phenomena such as Supersymmetry or Extra Dimensions.



Particle Physics is exciting research! You can take your part in that research on the following pages. The analysis of data samples that have been recorded in 2010 with the ATLAS detector is waiting for you. Under the points in the main (upper) menu, you can choose between two different measurements with original data from the ATLAS experiment. They are called W-path and Z-path. The processing of each path requires about 90 minutes. There is a theoretical introduction at the beginning of each task. This is followed by exercises and the actual measurement.

Links



Facebook



LHC Livescreen





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W-path – search for the Higgs boson using real data



HOME PAGE

W-PATH

Z-PATH

Search for the Higgs

Task 2

*Among other things, the LHC was built to find evidence of the Higgs field in our universe by discovering the Higgs particle for which physicists have been searching for a while. Theoretical predictions tell us that heavy particles, e.g. top quarks, produced in collisions within the LHC might produce such Higgs particles. But this has not yet been observed. However, you can look for them! A few simulated Higgs events were hidden in real data.
Find the Higgs events!*

You also need to know criteria, which will enable you to identify a possible Higgs candidate. A Higgs candidate event must:

- contain EXACTLY TWO OPPOSITE electric charged leptons, which
- are isolated on the one side and
- each of them must have a transverse momentum of at least 20 GeV. Furthermore
- a missing transverse momentum of at least 40 GeV is required.

Only if an event fulfils all these criteria a Higgs particle might have been

Content

AIMS/TASKS

IDENTIFYING PARTICLES

IDENTIFYING EVENTS

MEASUREMENT

STRUCTURE OF THE PROTON

Search for the Higgs

ANALYSIS



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Event displays

www.18.12u2.org/elab/cms/event-display/

/ZeeZee_1.ig:EventsRun_142963/Event_22372619

Detector Model

- Tracker
- ECAL Barrel
- ECAL Endcap
- ECAL Preshower
- HCAL Barrel
- HCAL Endcap
- HCAL Outer
- HCAL Forward
- Drift Tubes (muon)
- Cathode Strip Chambers (muon)
- Resistive Plate Chambers (muon)

Tracking

- Tracks (reco)(21)
- Electron Tracks (GSP)(4)
- Clusters (Si Pixels)(102)
- Clusters (Si Strips)(1172)
- Rec. Hits (Tracking)(301)

ECAL

- Barrel Rec. Hits(1126)
- Endcap Rec. Hits(946)
- Preshower Rec. Hits(254)

HCAL

- Barrel Rec. Hits(827)
- Endcap Rec. Hits(300)
- Forward Rec. Hits(144)
- Outer Rec. Hits(379)

Muon

Controls:

- rotate
- CM → pan x / y
- Shift → pan z

Similarly MINERVA based on ATLANTIS (ATLAS)



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New IPPOG Outreach Database

First-ever global database for materials related to particle physics outreach and informal education

- recommended tools and materials: videos, brochures, posters, talks, ideas for hands-on activities, . . . shared by members and partners of the IPPOG network.
- already more than 300 items – tagged for easy access
- available for anyone engaged in particle physics outreach initiatives
- share your ideas/materials by becoming a registered user and upload your material
- suggestions and feedback appreciated



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The database interface is temporary ...

[https://cms-docdb.cern.ch/cgi-bin/
PublicEPPOGDocDB/DocumentDatabase](https://cms-docdb.cern.ch/cgi-bin/PublicEPPOGDocDB/DocumentDatabase)



Use [Indico](#) for meetings, [CDS](#) for official papers, notes and photos and [EDMS](#) for engineering documents.

For anything else or if in doubt, use [DocDB](#).

Search by [title](#), [author](#), [category](#) or [keywords](#) [Advanced search](#)

Browse by: [author](#), [topic](#), [group](#), [see recent](#), [see all](#)

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Document Database

Welcome to IPPOG DocDB at CERN. Access is by CERN Single-Signon.



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new interface being developed



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Resources

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[Professional Development & Program Guides](#)

[FAQs](#)

Welcome !

What is this?

This is a database that holds recommended tools and materials to be used in bringing the exciting world of particle physics to students of all ages and the general public. Here you can find videos, brochures, posters, talks, ideas for hands-on activities and...

This is a database that holds recommended tools and materials to be used in bringing the exciting world of particle physics to students of all ages and the general public. Here you can find videos, brochures,

Learning Topics



- ▶ Physics
- ▶ Technology
- ▶ International Collaboration
- ▶ Broader Impacts

LATEST

FEATURED

How would the universe have turned out if the elementary particles had slightly different masses?

In four episodes, this animation shows the development of our own universe and three alternative scenarios.



Search

Learning Topic

- Any -

Audience

- Any -

Language

- Any -

Item Type

- Any -

Use

- Any -

Key Words

GO

Languages

[English](#)

[French](#)

[German](#)

Audience

Educators

Science advocate



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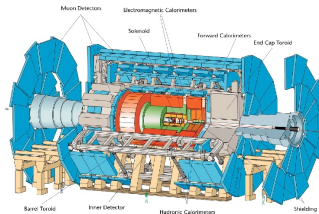
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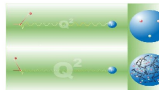
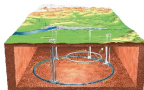
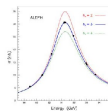
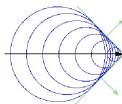
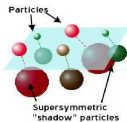
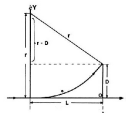
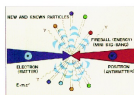
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Partikelfysik - ved Esben Klinkby





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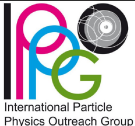
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International Particle
Physics Outreach Group



<http://ipog.web.cern.ch>
<http://facebook.com/IPPOG>

WHO ARE WE?

We are a network of scientists, science educators and explainers engaged in informal science education and outreach for particle physics across the globe. Our growing membership currently includes representatives from each member state of CERN, each major experiment at CERN's Large Hadron Collider (LHC) and prominent labs and institutions in the USA and Europe.

WHAT IS OUR AIM?

Our aim is to contribute to global efforts in strengthening cultural awareness, understanding and support of particle physics and related sciences.

HOW DO WE DO THIS?

By facilitating and contributing to outreach and inform particle physics across the globe, and by sharing this exp

WHO DO WE SERVE?

Anyone who wants to know more about particle physics (from school to university).

HOW CAN IPPOG HELP YOU?

You, the student

IPPOG can...

tell you about our outreach programs in your area and how to get involved
point you to recommended learning resources on-line

You, the scientist

IPPOG can...

share with you recommended tools and materials to effectively engage your community during talks, presentations, discussions

put you in touch with current outreach and science education programs near you

help you explore opportunities to start your own outreach initiatives via practical advice from our extensive network

You, the teacher/science explainer

IPPOG can...

SAMPLE IPPOG ACTIVITIES



Hands-on particle physics

International MasterClasses provide an opportunity for high school students to be "scientists for a day." 16- to 18-year-old students in countries around the world are invited to one of about 120 nearby universities for a day in order to take part in an authentic research process. Lectures from active scientists give insight in topics and methods of basic research in matter and forces, enabling the students to perform measurements on real data from the LHC. At the end of each day, live in an international research collaboration, the participants join in a video conference with CERN for discussion and combination of their results. International MasterClasses offer students the chance to close their textbooks and experience modern science first-hand!



HOW YOU CAN GET INVOLVED

IPPOG encourages newcomers to join the International MasterClasses, either institutes willing to host a Masterclass or schools eager to participate in one. We will provide you with the information and material necessary to either organize or take part in an event that students and staff will never forget.

For more information, please see www.physicsmasterclasses.org or contact masterclasses@physik.tu-dresden.de

HOW YOU CAN GET INVOLVED



Although relatively new and evolving, the database already contains over 200+ entries. Besides additional content, the database needs a more user-friendly and attractive interface.

So, what can you do to help the database become a super useful tool? Browse it. Use it. Contribute content! Make concrete suggestions for improvements!

For more information, please see <http://ipog.web.cern.ch/ipog/IPPOGdatabase.html> or contact ipog_admin@cern.ch



Outreach Database

A new IPPOG initiative, the outreach database is the first-ever global database for materials related to particle physics outreach and informal education. It houses videos, brochures, posters, talks, ideas for hands-on activities and more, in a variety of languages! Items stored here are shared by members and partners of the IPPOG network.

HOW CAN YOU HELP IPPOG?

You, the student

can...

enroll in an International Masterclass and tell your friends
tell us about great learning tools for particle physics that you like

You, the scientist

can...

get involved with an IPPOG International Masterclass, either at CERN or in your institute

share suggestions for outreach tools and materials via our [Outreach Database](#)

follow us on Facebook and share ideas

You, the teacher/science explainer

can...

participate in an International Masterclass

browse our [Outreach Database](#) and add your own items to share with others

follow us on Facebook and share suggestions for new classroom tools and materials to be developed



Discovering Particle Physics Together



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Discovery Packages

One-stop-shop for people wanting to know everything about a “discovery” or important measurement

	Fact sheets	Animation	Photographs	Plots & Diagrams	Contact persons	Quotes	Presentations	Data files
Why is it important?	X	X			X	X	X	
How was it discovered?		X		X				
Who discovered it?			X	X	X			
What happens next?		X			X	X	X	
How does this affect me?	X							
Practical implications?	X				X			
Teaching materials	X	X						X
How do I become involved?								X

Idea to have a matrix-like web-site structure to house this material, including background text/images/videos/interviews as well as items surrounding the breakthrough



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First steps: background material etc for the press

<http://press.web.cern.ch/press/background>

Backgrounders

English version	Other languages
Higgs	FR
<ul style="list-style-type: none">• Evolution or revolution?• Important terms in Higgs research• Higgs Limit FAQ	FR - FR
Supersymmetry	FR
Dark matter	FR
Extra dimensions	FR
Matter/antimatter asymmetry	FR
W prime and Z prime	FR
Compositeness	FR
Fourth generation particles	FR

Animations

Description	Language	Video reference
The Higgs mechanism	silent	1406032
The Higgs mechanism (with subtitles)	English	1406034

Video interviews

Interviewee	Description	Language	Video reference
Guido Tonelli (CMS spokesperson)	Higgs update	English	1404258
Guido Tonelli (CMS spokesperson)	Higgs update	Italian	1404952



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To complement materials from the experiments themselves

Home Info Multimedia Store Blogs Links Tour of ATLAS Contact Collaboration Site Press Student/Teachers

ATLAS News

[Tweet](#) [Like](#) [Send](#) 421 likes. Sign Up to see what your friends like.

ATLAS experiment presents latest Higgs search status

December 13, 2011

The statement below is also available in:
[Chinese](#) | [Dutch](#) | [French](#) | [German](#) | [Italian](#) | [Japanese](#) | [Brazilian Portuguese](#) | [Portuguese](#)

The latest update of the ATLAS searches for the Standard Model Higgs boson was presented at a CERN seminar on December 13, 2011. As stated in the CERN press release, the new ATLAS and CMS results are "sufficient to make significant progress in the search for the Higgs boson, but not enough to make any conclusive statement on the existence or non-existence of the elusive Higgs. Tantalising hints have been seen by both experiments in the same mass region, but these are not yet strong enough to claim a discovery."

"We have restricted the most likely mass region for the Higgs boson to 115-130 GeV, and over the last few weeks we have started to see an intriguing excess of events in the mass range around 125 GeV," explained ATLAS experiment spokesperson Fabiola Gianotti. "This excess may be due to a fluctuation, but it could also be something more interesting. We cannot conclude anything at this stage. We need more study and more data. Given the outstanding performance of the LHC this year, we will not need to wait long for enough data and can look forward to resolving this puzzle in 2012."

The CMS experiment also has updated their results in this same low mass region.

The Higgs boson is predicted by the Standard Model.

Links

- CERN Press Release: English / French
- Interview with Fabiola Gianotti
- Background on the Higgs
- Animation of event, 4 muons
- Animation of event, 2 electrons & 2 muons
- Animation of event, 2 photons
- Event Displays
- Higgs limit plot for masses between 110-150 GeV
- Higgs limit plot for masses between 110-600 GeV
- Important terms in discussing the search for the Higgs boson
- CMS Experiment latest Higgs results
- Phil Owen's "ATLAS Multimedia Contest" winning film about the Higgs

ATLAS Notes about the latest results

- Combination of Higgs Boson Searches...
- Search for the Standard Model Higgs boson in the decay channel $H \rightarrow ZZ(\gamma) \rightarrow 4$ leptons...
- Search for the Standard Model Higgs boson in the diphoton decay...
- Search for the Higgs boson in the $H \rightarrow WW(\gamma) \rightarrow l\nu l\nu$ decay channel...

Other Stories

- ATLAS experiment presents latest Higgs search status [December 2011]
- How the ATLAS - CMS Higgs combination group created this plot [December 2011]
- What if there is no Higgs boson? [November 2011]
- ATLAS and CMS combine summer '11 search limits on the Standard Model Higgs [November 2011]
- ATLAS reveals latest results at HCP11 [November 2011]
- ATLAS Reaches Milestone: 5 Inverse Femtobarns of Data! [October 2011]
- ATLAS Goes Pop in Paris [October 2011]

Other Items

- Discovery Quest
- Check out the ATLAS fact sheets.
- ATLAS FAQs
- ATLAS eTours
- ATLAS News Home



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To complement materials from the experiments themselves

Compact Muon Solenoid experiment at CERN's LHC



Public Website | Collaboration Website

Collaboration | Detector | Physics | News | Resources | Jobs | Contact CMS | Help

Old Public Site

CERN • CMS Experiment • CMS search for the Standard Model Higgs Boson in LHC data from 2010 and 2011

About CMS

- What is CMS?
- Civil Engineering
- Higgs Boson Search
 - How might the Higgs gives some particles mass?
 - How is CMS searching for the Higgs Boson?
- CMS Higgs Results
 - CMS search for the Standard Model Higgs Boson in LHC data from 2010 and 2011**
 - ATLAS and CMS combine summer '11 search limits on the Standard Model Higgs
 - New CMS Higgs Search Results for the Lepton Photon 2011 Conference
 - New CMS Results for the EPS 2011 Conference
 - If we don't find the Higgs Boson...

CMS search for the Standard Model Higgs Boson in LHC data from 2010 and 2011

CERN, 13th December 2011

The statement below is also available as PDF files in: Chinese (traditional) | Chinese (simplified) | Croatian | Dutch | English | Finnish | French | German | Greek | Hungarian | Italian | Persian | Polish | Spanish | Portuguese | Russian | Serbian | Turkish

The Higgs boson is the only particle predicted by the Standard Model (SM) of particle physics that has not yet been experimentally observed. Its observation would be a major step forward in our understanding of how particles acquire mass. Conversely, not finding the SM Higgs boson at the LHC would be very significant and would lead to a greater focus on alternative theories that extend beyond the Standard Model, with associated Higgs-like particles.

Today the CMS Collaboration presented their latest results in the search for the Standard Model Higgs boson, using the entire data sample of proton-proton collisions collected up to the end of 2011. These data amount to 4.7 fb^{-1} of integrated luminosity[1], meaning that CMS can study Higgs production in almost the entire mass range above the limit from

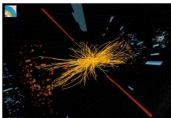


Figure 1: A typical candidate event including two high-energy photons whose energy (depicted by dashed yellow lines and red towers) is measured in the CMS electromagnetic calorimeter. The yellow lines are the measured tracks of other particles produced in the collision. [See more event display images.]

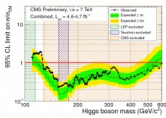


Figure 2a: Exclusion limit on the mass of the SM Higgs boson at 95% confidence

CMS Live

Multimedia

Physics Results

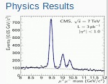





Image library



Event display images



Detector photos





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To complement materials from the experiments themselves

Compact Muon Solenoid experiment at CERN's LHC

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CERN • CMS Experiment • CMS search for the Standard Model Higgs Boson in LHC data from 2010 and 2011

About CMS

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 - New CMS Results for the EPS 2011 Conference
 - If we don't find the Higgs Boson...

CMS search for the Standard Model Higgs Boson in LHC data from 2010 and 2011

CERN, 13th December 2011

The statement below is also available as PDF files in: Chinese (traditional) | Chinese (simplified) | Croatian | Dutch | English | **Finnish** | French | German | Greek | Hungarian | Persian | Polish | Spanish | Portuguese | Russian | Serbian | Turkish

Figure 1: A typical candidate event including two high-energy photons whose energy (depicted by dashed yellow lines and red towers) is measured in the CMS electromagnetic calorimeter. The yellow lines are the measured tracks of other particles produced in the collision. [See more event display images.]

The Higgs boson is the only particle predicted by the Standard Model (SM) of particle physics that has not yet been experimentally observed. Its observation would be a major step forward in our understanding of how particles acquire mass. Conversely, not finding the SM Higgs boson at the LHC would be very significant and would lead to a greater focus on alternative theories that extend beyond the Standard Model, with associated Higgs-like particles.

Today the CMS Collaboration presented their latest results in the search for the Standard Model Higgs boson, using the entire data sample of proton-proton collisions collected up to the end of 2011. These data amount to 4.7 fb^{-1} of integrated luminosity[1], meaning that CMS can study Higgs production in almost the entire mass range above the limit from

Figure 2a: Exclusion limit on the mass of the SM Higgs boson at 95% confidence

including translations to Nordic languages!



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