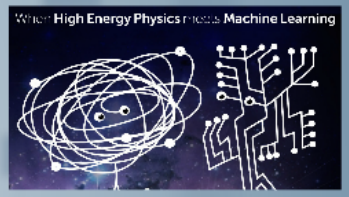
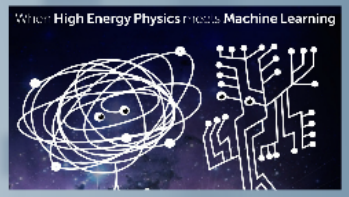


Involving other communities through challenges and cooperation

Clara Nellist (LAL-Orsay)
on behalf of the ATLAS Collaboration

EPS - HEP 2015 (22-29th July 2015), Vienna, Austria



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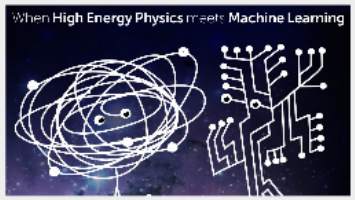
Introduction

The ATLAS collaboration has recently setup three projects targeting citizen science or specific communities.

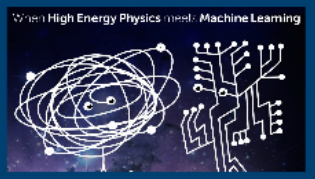
- Higgs Machine Learning
- ATLAS@Home
- Higgs Hunters

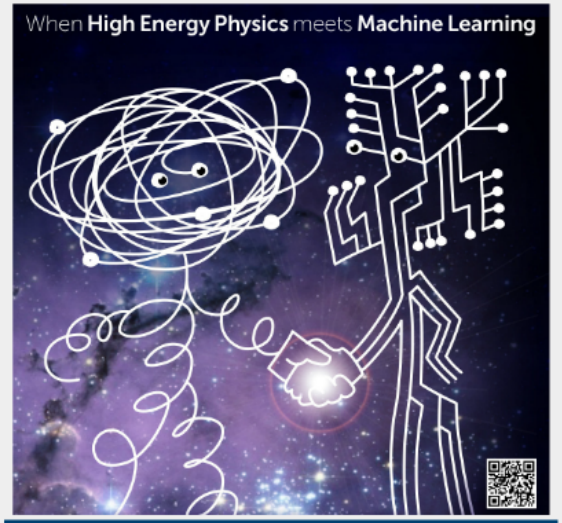


Higgs Machine Learning

#HiggML

http://higgsml.lal.in2p3.fr



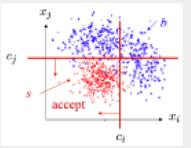


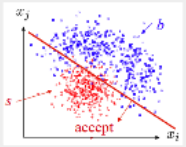
The HiggsML poster advertising the challenge.

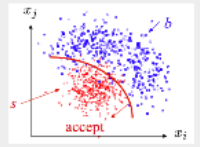
Aim: To benefit from the knowledge of the machine learning community and to engage the public with the type of analysis work required to discover the Higgs.
Duration: The challenge ran from May to September 2014 on the Kaggle platform.
Sample: The signal used was Higgs to two tau particles, simulated by the ATLAS experiment.

Content from David Rousseau

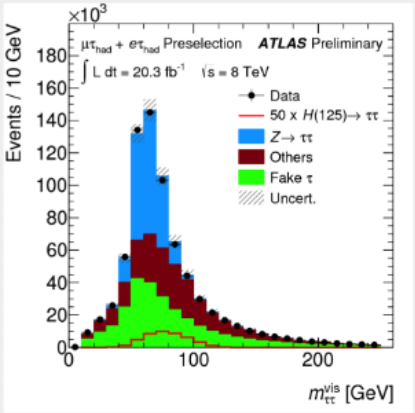
Goal: Sort into two groups.
1) Higgs
2) Everything else







Prizes:
1st Place - $7,000
2nd Place - $4,000
3rd Place - $2,000



Outcome:

- The significance of the dataset increased by 20% with respect to the traditional HEP tool (TMVA).
- It was a very fruitful collaboration established with the machine learning community.
- New techniques and new software came from the collaboration.

Tianqi Chen and Tong He received the "HEP meets ML" award

1785 teams
1943 players
35772 entries

Kaggle's most popular challenge event at the time!

The dataset used in the challenge will remain on CERN Open Data Portal with a citeable d.o.i.:
http://opendata.cern.ch/collection/ATLAS-Higgs-Challenge-2014

- Contains ~800k events.

Leaderboard

1. Gábor Melis
2. Tim Salimans
3. nhlx5haze
4. ChoKo Team
5. cheng chen
6. quantify
7. Stanislav Semenov & Co (HSE Yandex)
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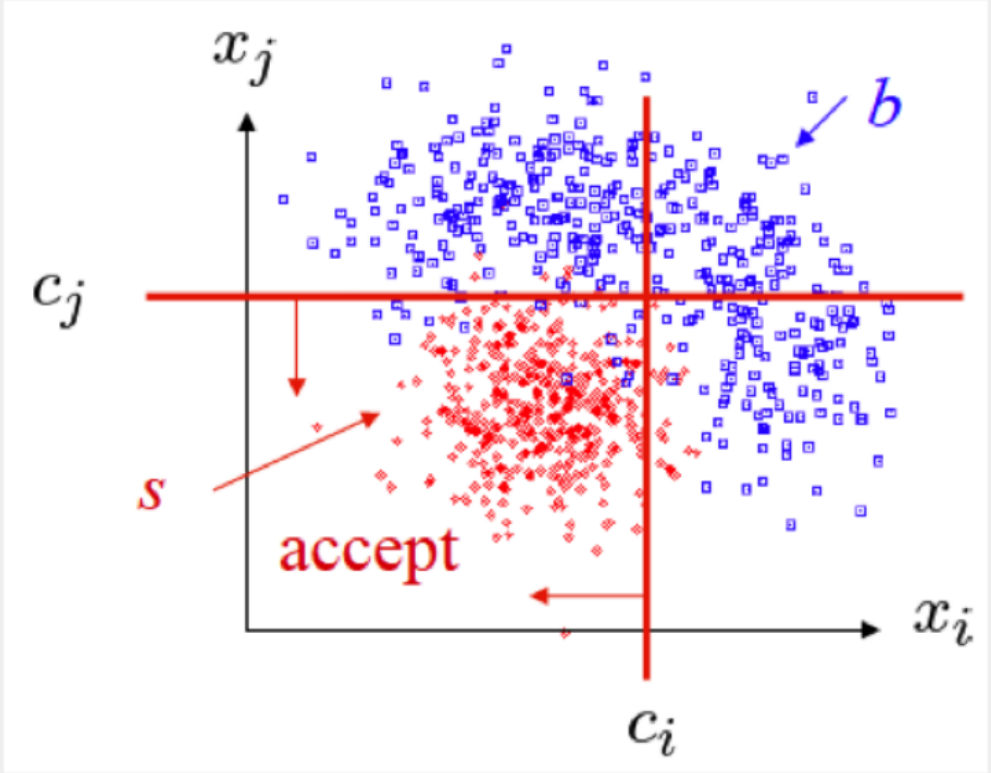

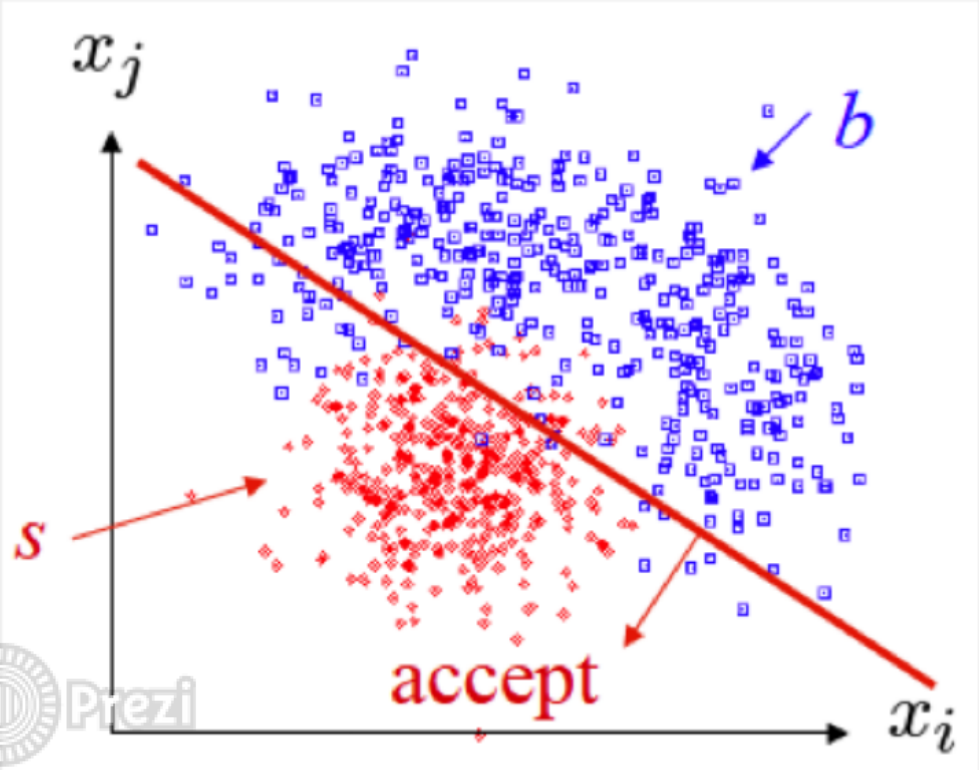

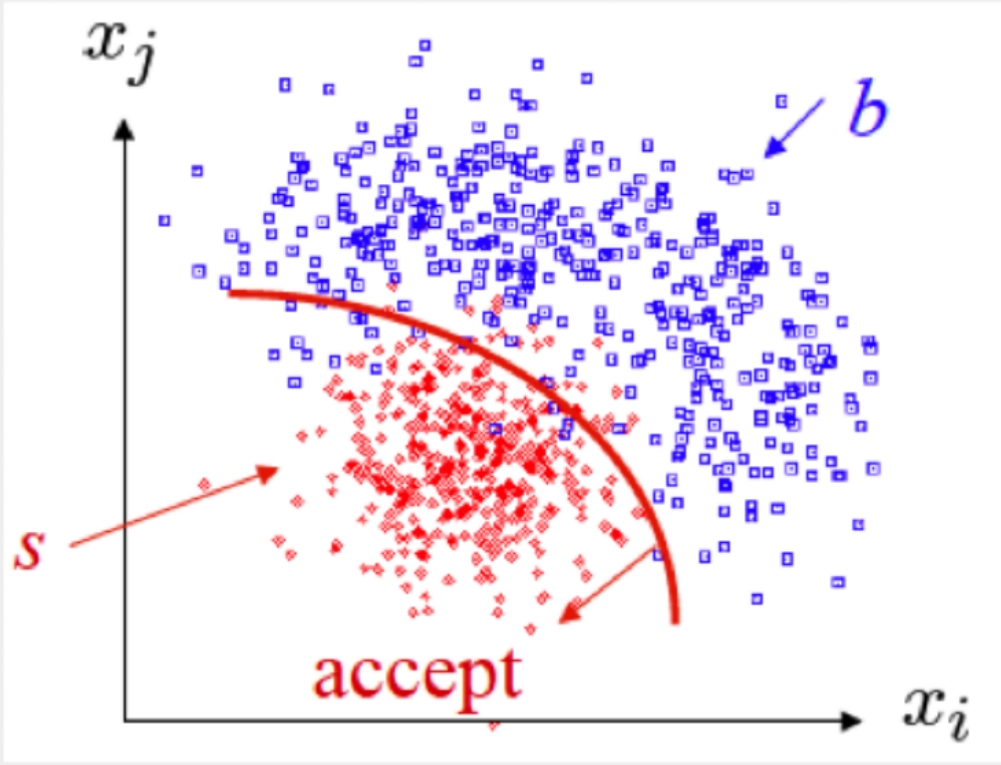

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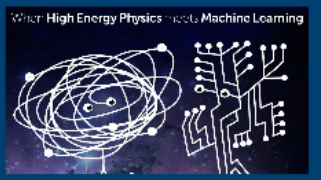

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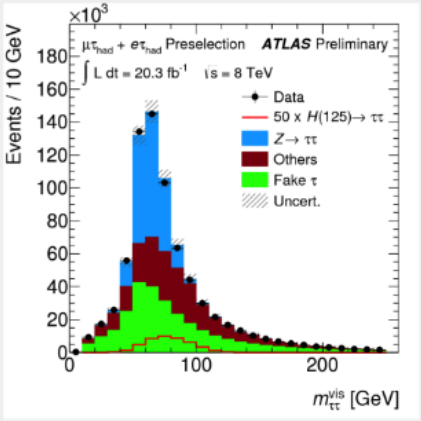

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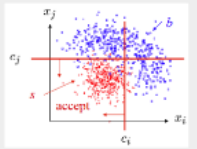

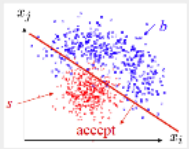

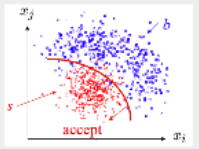

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ATLAS@Home

http://lhcathome.web.cern.ch/projects/atlas

Content from Claire Adams Bourdarios

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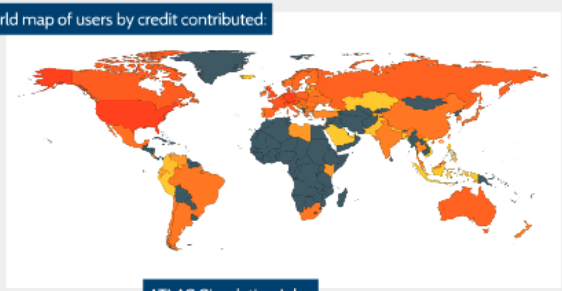
- With the start of LHC, the number of people attracted for outreach reasons is growing.

User of the day

LHCByloved

Hi there! I am born in 1982 and I spend much time thinking about scientific and philosophical questions concerning the world around us. I also like...

World map of users by credit contributed:



Various badges for users to earn through their contributions.

Rewards are for different contributions:

- **Quarks** - for being in the top Nth percentage of the users contributing the most Recent Average Credit (RAC).
  - The top 1% get a top quark.
- **Leptons** - for perseverance.
  - After 180 days, they get a tau neutrino.
- **Bosons** - years of involvement.
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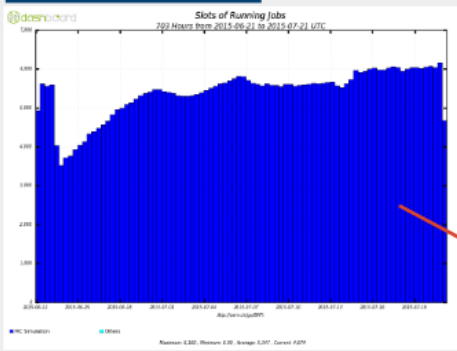
No knowledge of particle physics is required, but for those interested in the physics processes simulated in ATLAS@Home as well as the ATLAS experiment itself visit our public page.

ATLAS jobs running on BOINC site:



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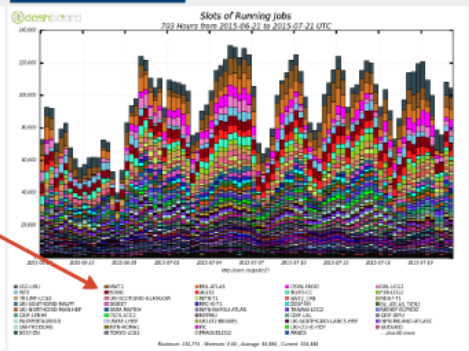

"**More WUs please !**" - Yeti, 31st January 2015

WU = Work Unit

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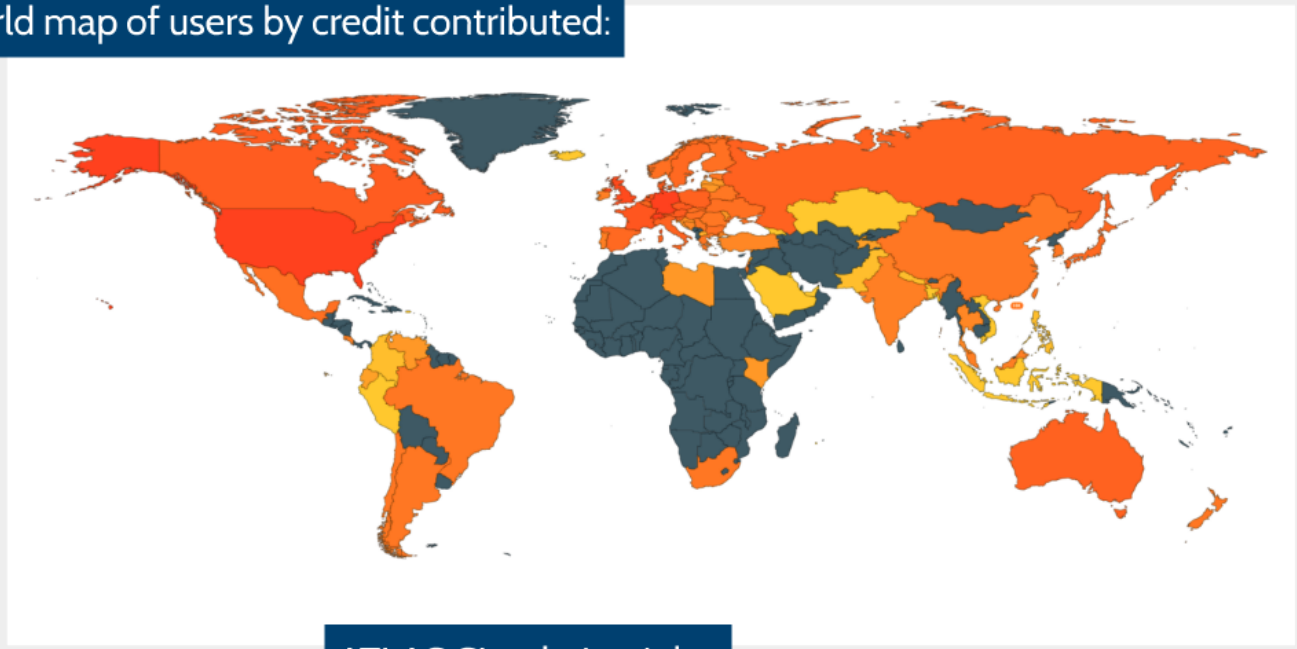

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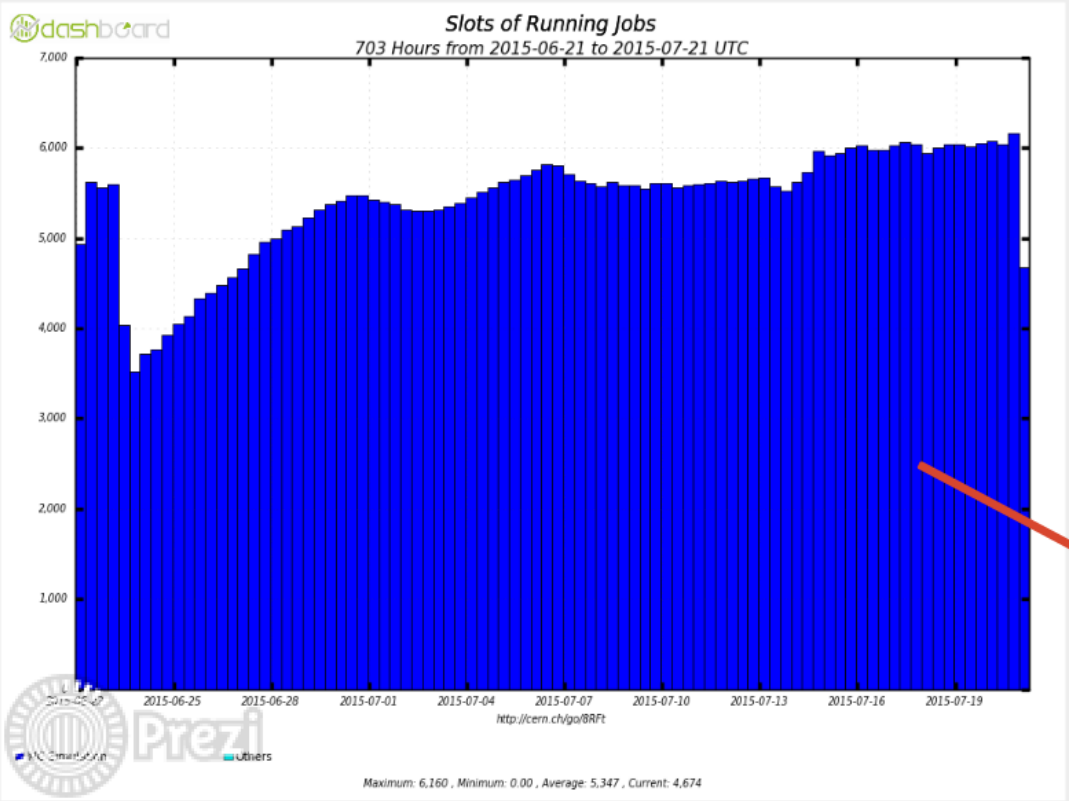

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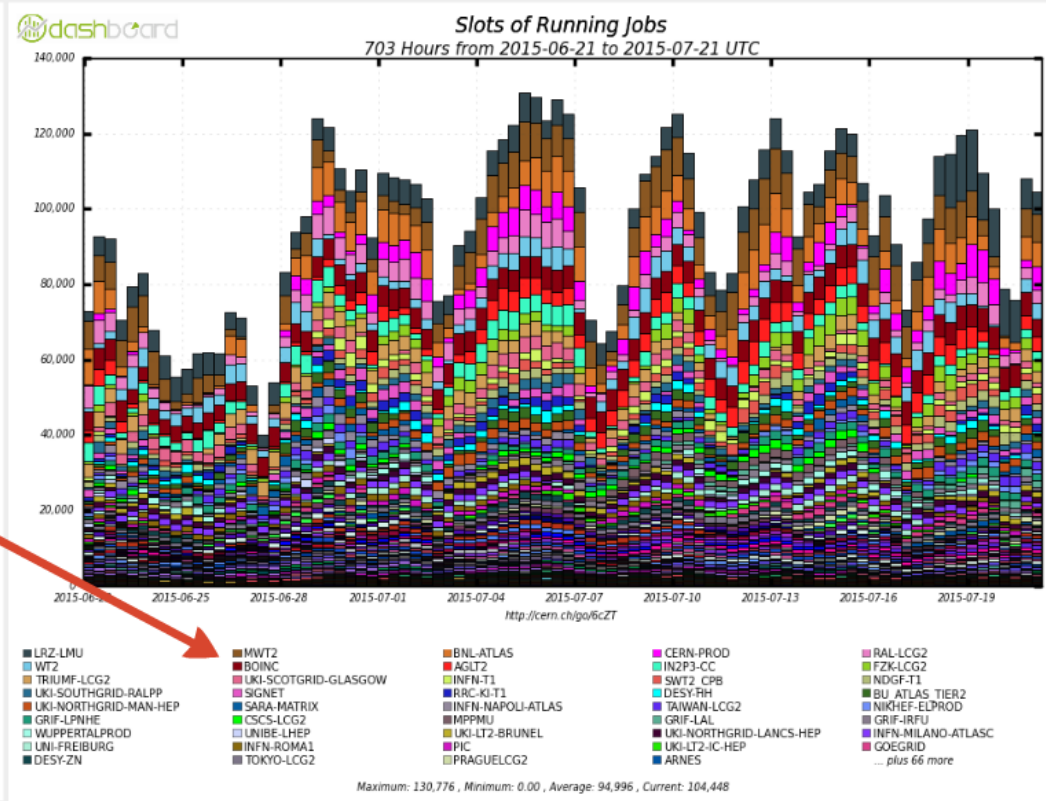

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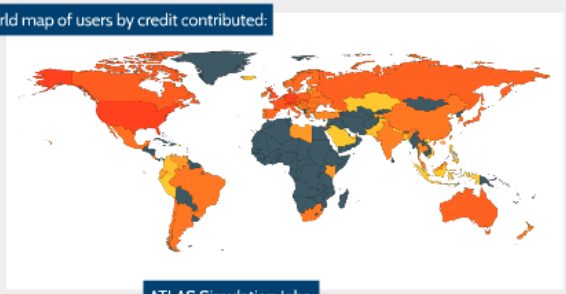

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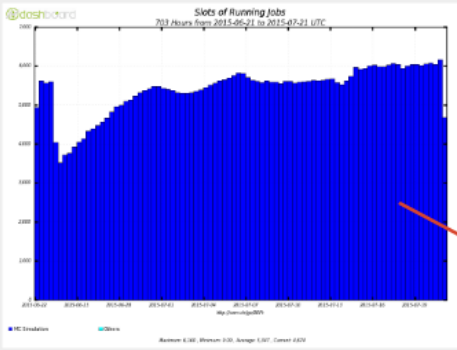

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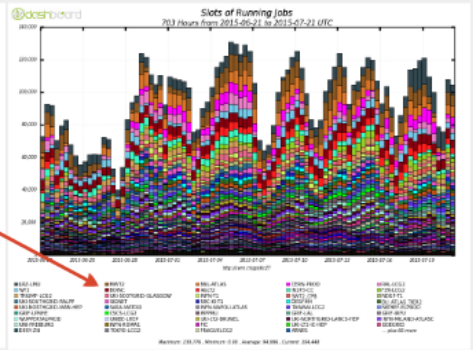

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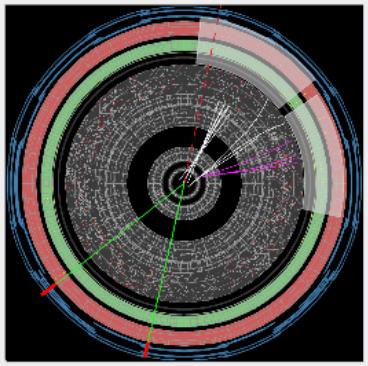
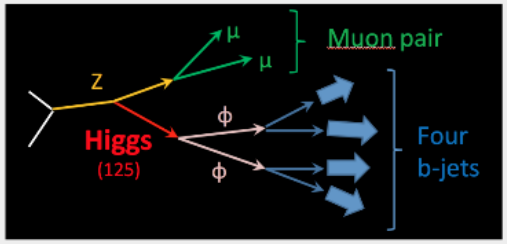
Higgs Hunters www.higgshunters.org

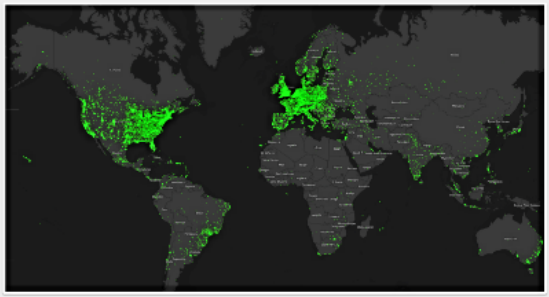
HIGGS HUNTERS

Content from Alan Barr

Zooniverse is a collection of web-based citizen science projects that use the efforts of volunteers to help researchers deal with the flood of data that confronts them.







Greater than one million users worldwide! With 20 projects and 60 papers.

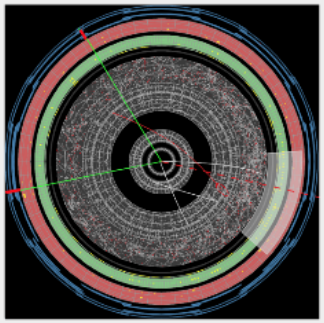
Higgs Hunters went live on Zooniverse in November 2014

Q: What are they classifying?
A: "Lines that seem to sprout from a common point that is NOT the center. These are called "Off-center vertexes" (OCVs)."

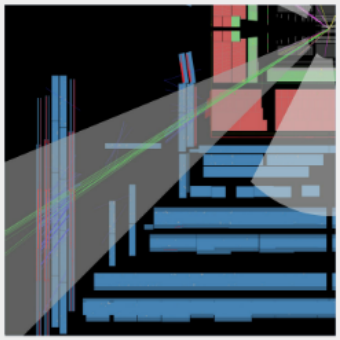
The statistics:

More than **800,000** classifications of **85,000** images by more than **6,000** different members of the public.

Interesting events seen so far...



Possible 'beam halo'
Particles that have been swept along with the LHC beam.



A 'punch-through'
A high-energy particle that bursts into a jet of particles at the edge of the calorimeter and looks like a jet of muons.

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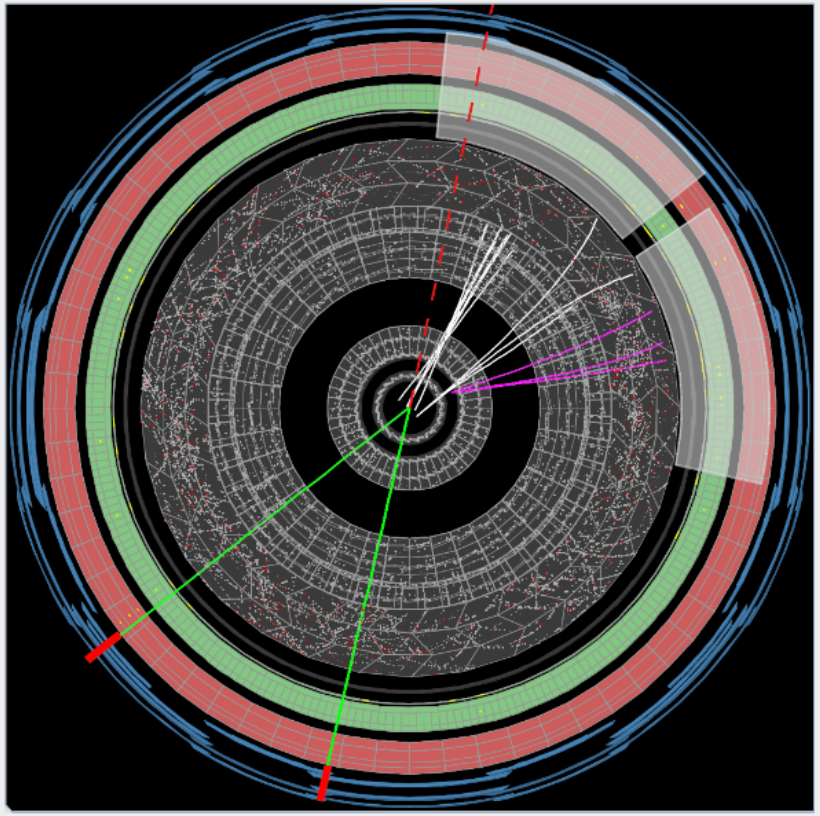

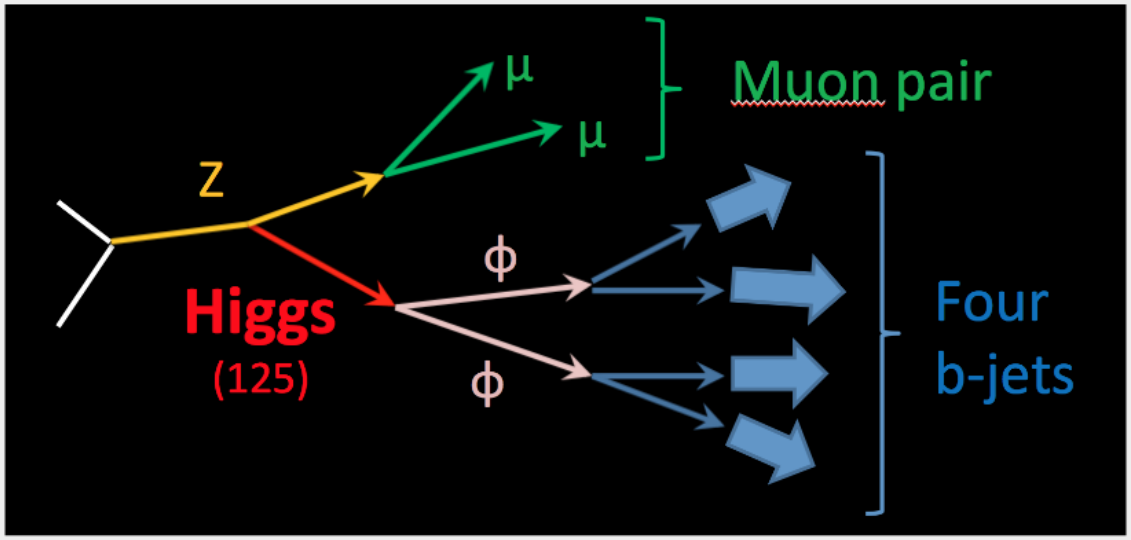

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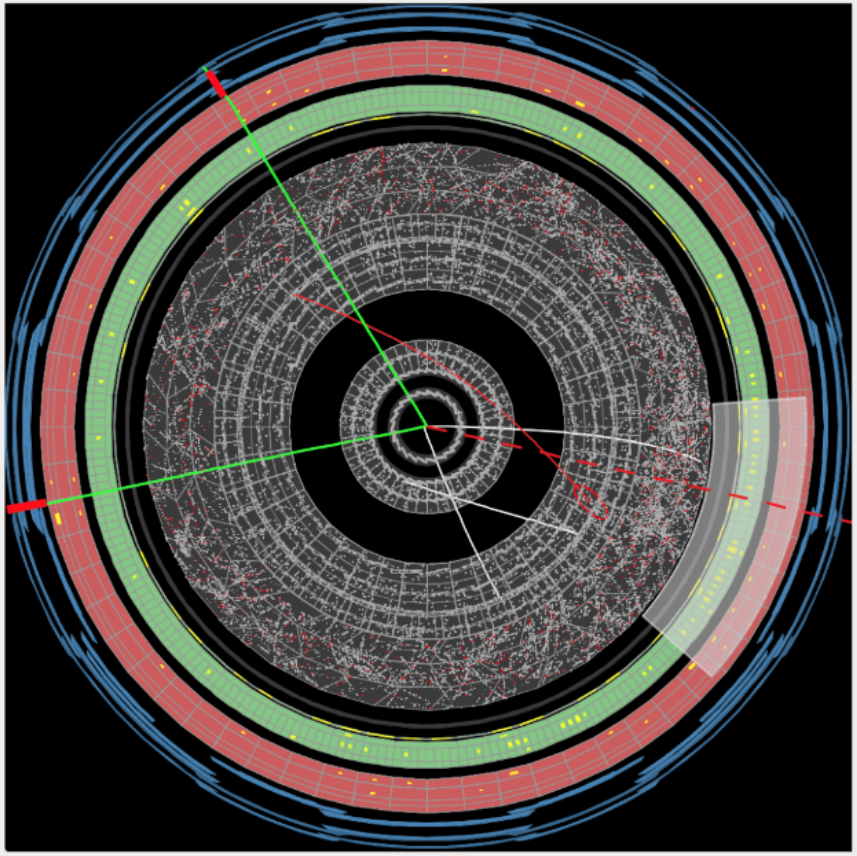

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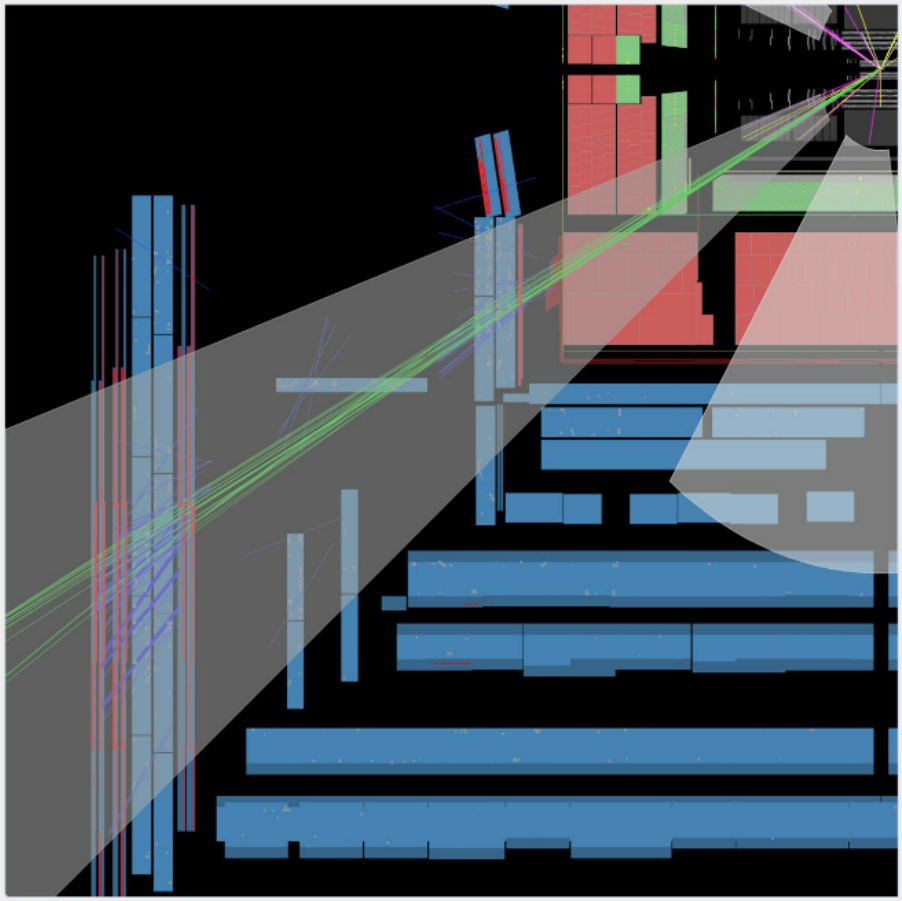

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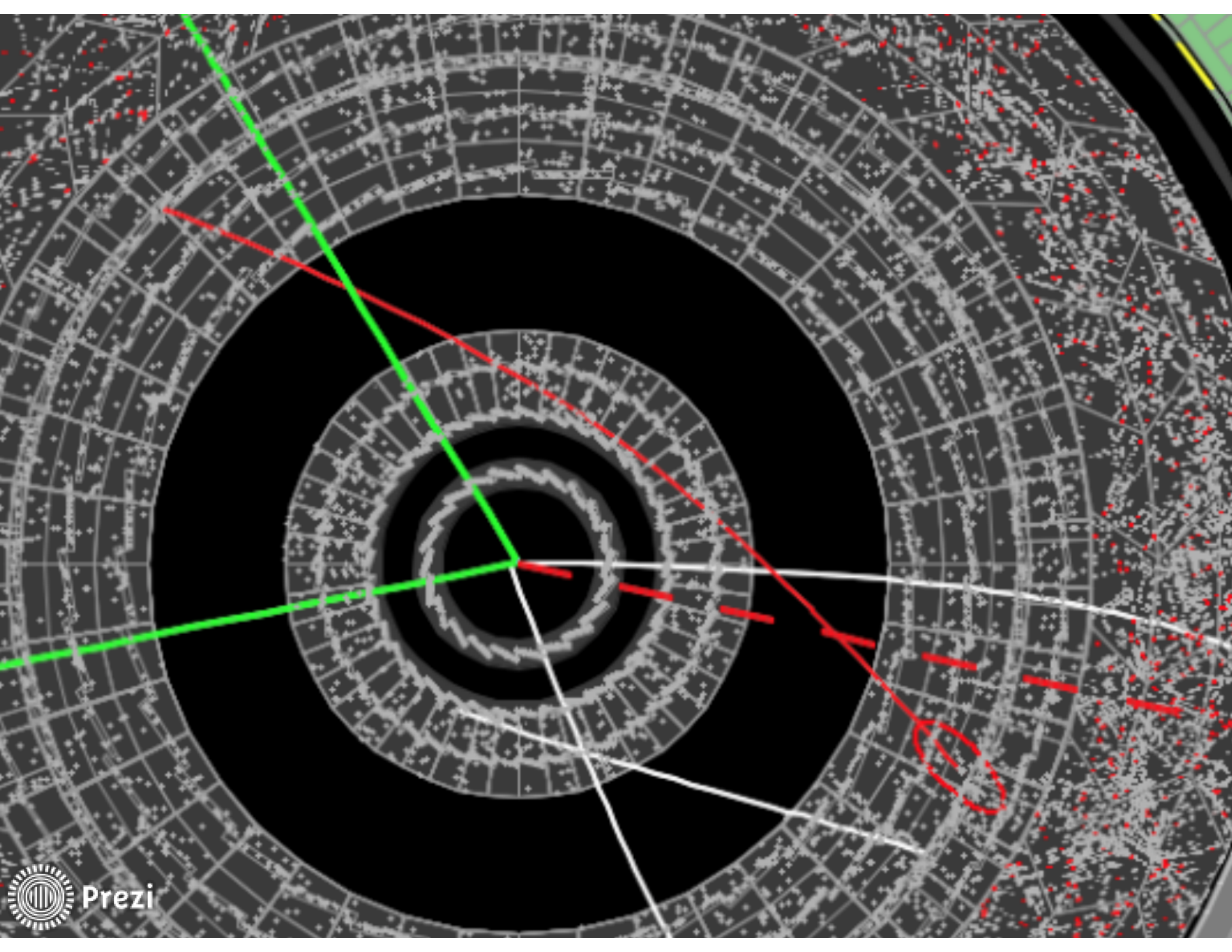
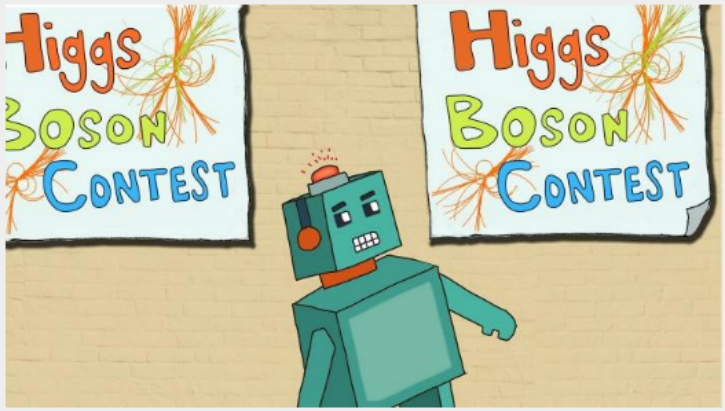

Prezi

Communicating the projects



Artwork by Sandbox Studio, Chicago. From Symmetry Magazine.

Social media can be used to inform the public about our various projects and encourage participation and discussion.

ATLAS Experiment
@ATLASexperiment

#ATLAS News: Are you up for the #Higgs challenge? tinyurl.com/mgoo7h4 #LHC #CERN #Physics #MachineLearning #HiggsML

Posted on Twitter, 9:29 AM - 17th June 2014

ATLAS Experiment
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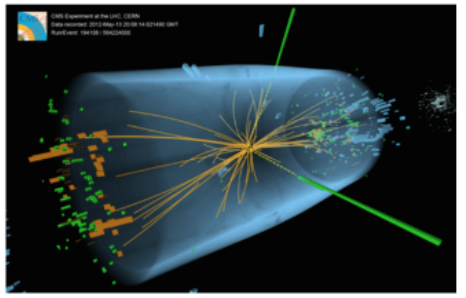
It's particle-hunting season! Scientists launch #Higgs Hunters Project - ow.ly/EZaXQ via @PhysOrg @the_zooniverse #ATLAS #CERN

Phys.org



It's particle-hunting season! NYU scientists launch Higgs Hunters...

New York University scientists and their colleagues have launched the Higgs Hunters project, which will allow members of the general public to study images recorded at the Large Hadron Collider and...

View on web

Posted on Twitter, 9:29 AM - 27th November 2014

[–] askCERN CERN [S] 552 points 1 month ago

You can also run ATLAS@home. With that you actually help the ATLAS experiment simulate collision data. We have detailed simulations we run and these are critical for us to fully use the LHC data we record. And, we are always short of computing power (even though we have a lot). Thanks very much in advance!!!

(bh)

permalink embed parent

[–] CorruptCanadian 204 points 1 month ago

This is the first time I have heard of the LHC@Home aspect of the CERN project. I didn't know that some of the computing protocols were being executed outside of the projects system.

How can we at home help with the projects ongoing expirments/computing??

CERN Ask Me Anything (AMA) on Reddit, June 2015

How you can get involved?

Although the **HiggsML** challange on Kaggle has finished, the dataset is still available online: http://higgsml.lal.in2p3.fr

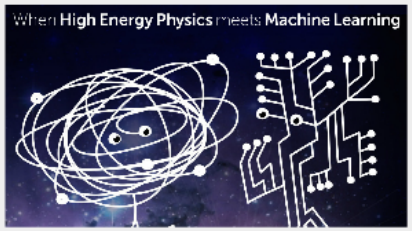
- LHCb have just released their own challenge to ask people to identify a rare decay phenomenon: https://www.kaggle.com/c/flavours-of-physics
- ATLAS and CMS are looking at another challenge.

Instructions for downloading **ATLAS@Home** can be found on the website: http://atlasathome.cern.ch

For **Higgs Hunters**, you can go directly to this link and get started! http://www.higgshunters.org/

Contributors

Higgs Machine Learning



ATLAS physicists :

LAL: Claire Adam-Bourdarios
David Rousseau
RHUL: Glen Cowan

Machine Learning scientists :

LAL: Balazs Kegl
LRI: Cécile Germain
Chalearn: Isabelle Guyon

ATLAS@Home

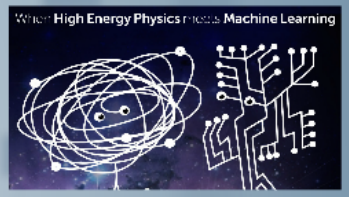
Andrej Filipčič
Claire Adam Bourdarios
David Cameron
Efrat Tal Hod
Eric Lancon
Riccardo Maria Bianchi
Wenjing Wu

Higgs Hunters

Oxford: Alan Barr
Thomas Hornigold
Chris Lintott
Ryan MacDonald
NYU: Andy Haas
Jeffrey Mei,
Birmingham: Pete Watkins

Further reading:

http://www.symmetrymagazine.org/article/july-2014/the-machine-learning-community-takes-on-the-higgs
http://www.symmetrymagazine.org/article/november-2014/needed-citizen-scientists-for-higgs-hunt



Involving other communities through challenges and cooperation

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on behalf of the ATLAS Collaboration

EPS - HEP 2015 (22-29th July 2015), Vienna, Austria