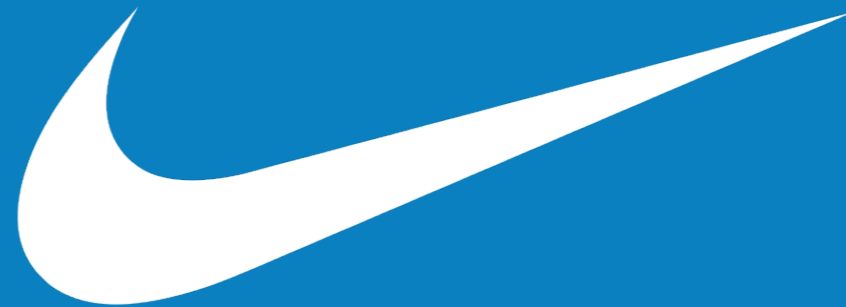


# ***OUTREACH***



**JUST DO IT.**

**INSIGHTS Workshop on Statistics and Machine Learning  
CERN, Sep 2018**

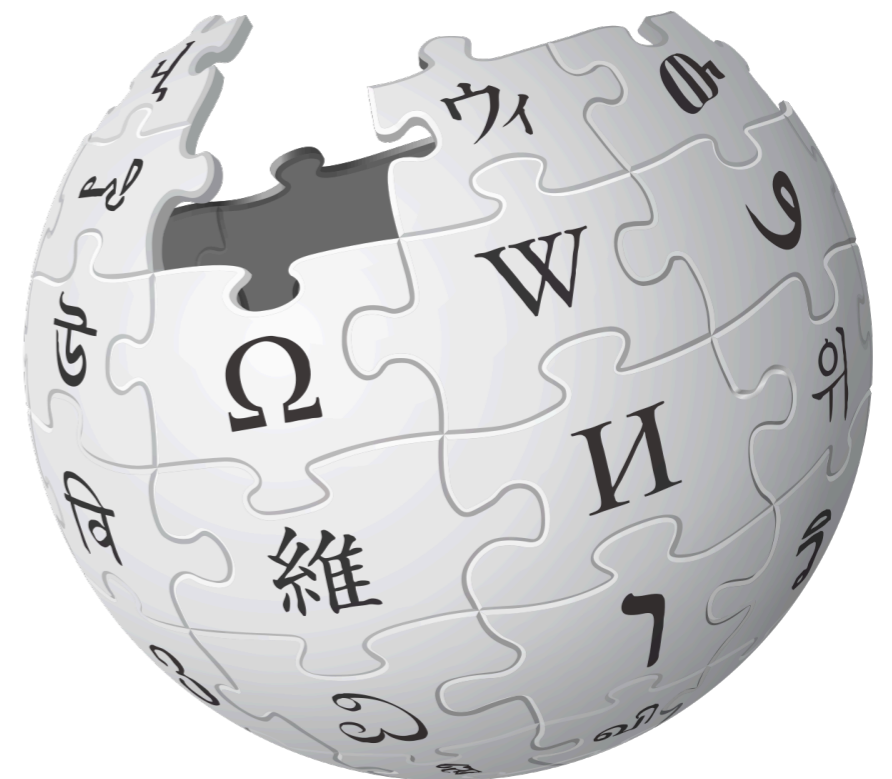
**Sascha Mehlhase (LMU Munich)**

## What outreach is and why we (should) do it

Wikipedia:

"**Science outreach**, also called Education and Public Outreach (EPO or E/PO) or simply **public outreach**, is an **umbrella term** for a **variety of activities** by research institutes, universities, and institutions such as science museums, aimed at **promoting public awareness (and understanding) of science** and making informal contributions to science education."

but it's **more than just that ...**



The "Wikipedia" logo is a trademark of Wikimedia Foundation, Inc.

## What outreach is and why we (should) do it

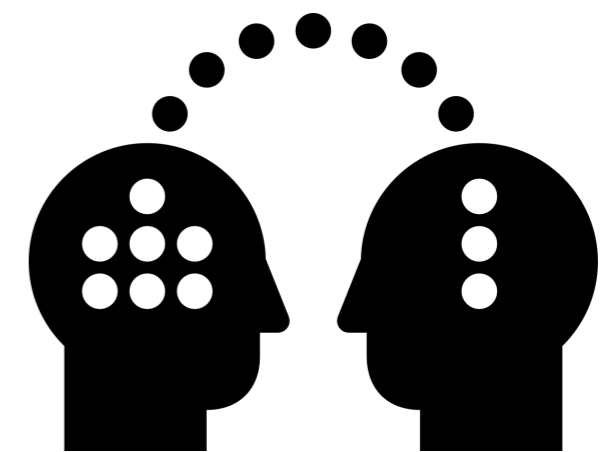
Science outreach is somewhat in the middle of science **education**, science **communication**, and science **policy making**

It is our means of **motivating the next generation** of scientists and **nurture support for science** in general and our field in particular

In all possible **target audiences**: policy makers, resource managers, teachers, students, citizens, ...

It is a principal instrument for **passing on the accumulated knowhow**, experience and expertise gained through science and research to the entire society

Especially true for publicly funded research



## What outreach is and why we (should) do it

It helps to **increase science literacy**, **correct misconceptions** about science, and contribute to the **public's view** of the value of (publicly funded) science

Eliminate **stereotypes** about scientists

Convey that **a scientist is also a person**, with human qualities like fallibility, finite knowledge, and interests outside of the lab

Improve **links between scientists and society**

It can (and should) address also those that have less access to scientific research, in particular young people from groups poorly represented in the scientific field



## Why it is good for individuals to do outreach?!

It is a chance to **improve teaching and communication skills**, and can be an important and beneficial **part of an early-career scientist's programme**

Makes you **think about the bigger picture** and **gets you out of your scientific comfort zone**

Especially activities that require you to explain what you are studying and why

It can magnify the **influence of your research**

Some funding agencies start to **recognise outreach** activities

Some even demand some (usually low) level of engagement

It is (and should be) **fun!!!**

Both for you and your target audience



picture © CERN

## Why people still do not do outreach

Early-career scientists are likely to be **busy with teaching and research commitments**

PhD students and postdocs **rarely receive any formal training**

**Lower value placed on outreach** by seniors and departments, and often a **lack of detailed information** about outreach opportunities

## How can we get more people to do outreach

**More recognition** for (young) scientists engaged in outreach activities

**Support outreach and education** at your institute, experiment or collaboration, and with regard to policy makers

**Make it an essential part** of an early-career scientist's programme

Given above-mentioned individual benefits also groups, institutes and funding agencies could benefit

**Make it easier** for (young) scientists to engage in activities

Even with small fractions of their time

**Make it fun!!!**

## How can you do outreach

Almost **a million ways** and all sort of levels of involvement ...

Check out **existing infrastructure** / person-power

get in touch with your group leader, institute, collaboration, outreach team, ...

**do something online**

write a blog, use your Twitter account, utilise Reddit's Ask Me Anything, ...

**face-to-face activities**

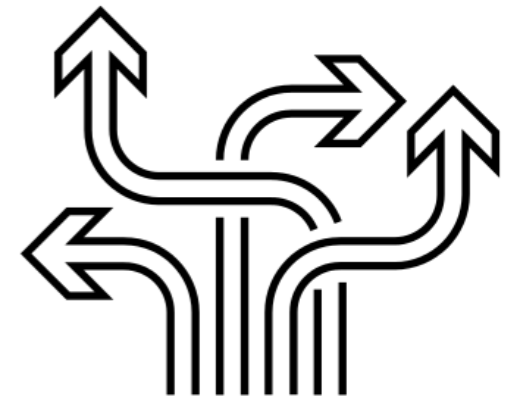
contact museums or science centres, science and non-science festivals, science cafés, after-school programmes, visit or invite schools, ...

**get people involved**

citizen science, educational use of data, art-meets-science programmes, open days and labs

come up with **your own idea**

think of activities that are **engaging, interactive and fun**





**now for two 'examples'**

## ATLAS as an example *of what is done how members can get involved*



Lots of members do all sorts of outreach activities at their institutes

Core team for **general outreach activities** and to support members

### Define, develop, and conduct our **communication programme and platforms**

Development of the public website, social media as well as written and multimedia material about scientific results, news and the collaboration itself

### Define, develop, and conduct our **education programme and platforms**

Create educational resources both online and offline for various target audiences

### Facilitate and support ATLAS-wide **outreach events and activities**

Provide outreach training, material and expertise to support members at their institutes

### Develop and organise the **presentation** of ATLAS and HEP outreach initiatives

Give visibility to our programme and individuals that contribute to it

## ATLAS as an example *of what is done how members can get involved*

Communication programme and platforms

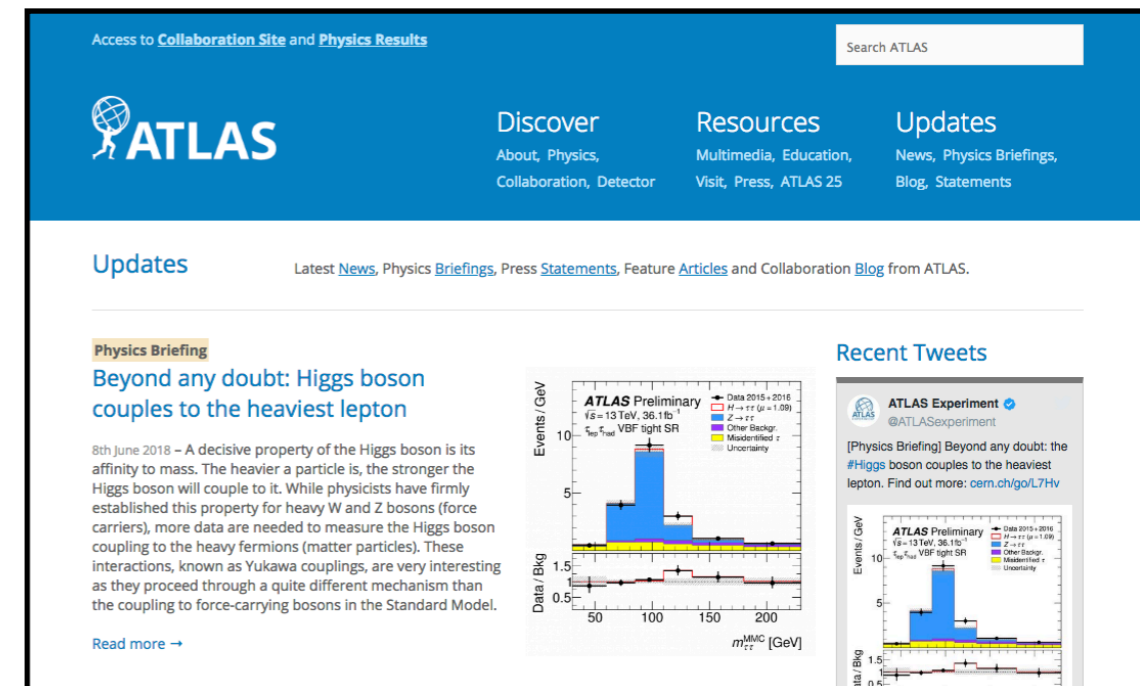
ATLAS website as our central hub to give visibility to the collaboration, its goals, achievements and members

High quality, in depth material in the form of press statements, physics briefings, news, portraits and blogs

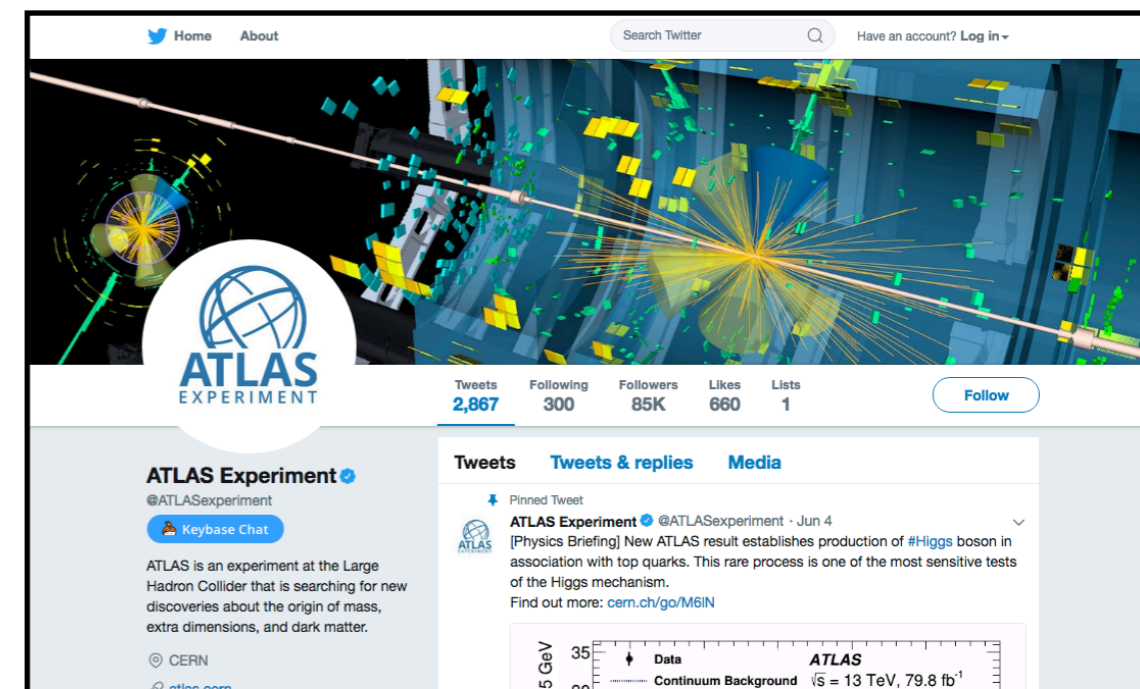
**Social media** to spread our content to a broader and more diverse audience

Facebook, Flickr, Google+, Instagram, Twitter, Youtube

Production of **dedicated social media material** to boost our reach and keep users on the platform, grabs their attention quickly and cater to algorithm (videos, animations, images, graphics, live events, ...)



The screenshot shows the ATLAS website homepage. At the top, there is a navigation bar with the ATLAS logo, a search bar, and links for 'Discover', 'Resources', and 'Updates'. Below the navigation bar, there is a 'Updates' section with a sub-header 'Latest News, Physics Briefings, Press Statements, Feature Articles and Collaboration Blog from ATLAS.' The main content area features a 'Physics Briefing' titled 'Beyond any doubt: Higgs boson couples to the heaviest lepton' with a date of 8th June 2018. To the right of the briefing is a 'Recent Tweets' section showing a tweet from @ATLASexperiment. Below the briefing and tweets are two identical plots showing 'Events/GeV' vs  $m_{\tau\tau}^{M/C}$  [GeV]. The plots show data points (black dots) and various background components (blue, red, green, yellow) with uncertainty bands.



The screenshot shows the ATLAS Twitter profile page. At the top, there is a header with 'Home', 'About', a search bar, and a 'Log in' button. The profile picture is the ATLAS Experiment logo. Below the profile picture, there are statistics: 2,867 Tweets, 300 Following, 85K Followers, 660 Likes, and 1 List. The main content area shows a 'Pinned Tweet' from ATLAS Experiment (@ATLASexperiment) dated Jun 4, titled '[Physics Briefing] New ATLAS result establishes production of #Higgs boson in association with top quarks. This rare process is one of the most sensitive tests of the Higgs mechanism.' Below the tweet is a plot showing 'Events/GeV' vs  $m_{\tau\tau}^{M/C}$  [GeV] with data points and background components.

## ATLAS as an example *of what is done how members can get involved*

Education programme and platforms

Provide **material, data and tools** for various target/age groups and proficiency levels

ATLAS colouring books to address even the youngest audience and allow them to get a first glimpse and identify themselves as a future scientist

IPPOG Masterclasses to give high school students a first hands-on experience within particle physics using data

ATLAS Open Data & Tools to actively involve students in university-level lab courses and projects



pictures © CERN for the ATLAS Collaboration

## ATLAS as an example *of what is done how members can get involved*

Support ATLAS-wide events and activities

**Make it easier** for members to get started

Offer support, experience, platforms, ...

**Provide platforms, tools and material**  
for outreach activities

Virtual Visits to offer even remote places a visit-like experience and get them involved and in touch with ATLAS scientists

Augmented and virtual reality tools like **ATLAScraft**, **ATLASrift** and **ATLAS in your pocket** as immersive, hands-on experiences and to raise attention at outreach events

Brochures, posters, hand-outs, ...



pictures © CERN for the ATLAS Collaboration

## 'Build Your Own Particle Detector' as an example

What **BYOPD** is and why it works so well

Three different components depending on the outreach activity in mind: **LEGO models**, **workshops** and **competitions**

Work as a simple exhibit, for closed-group events and open events

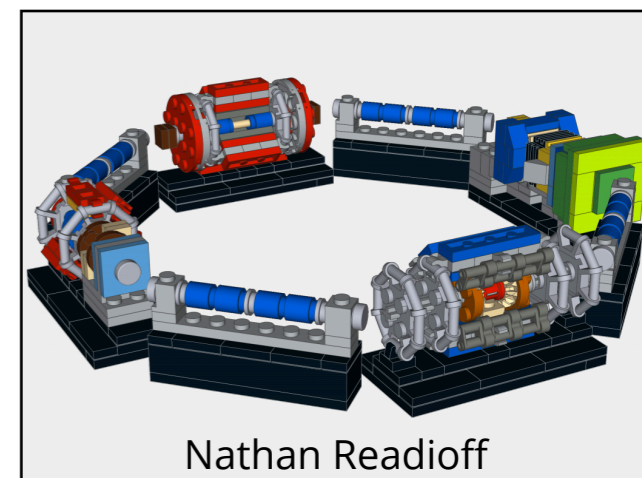
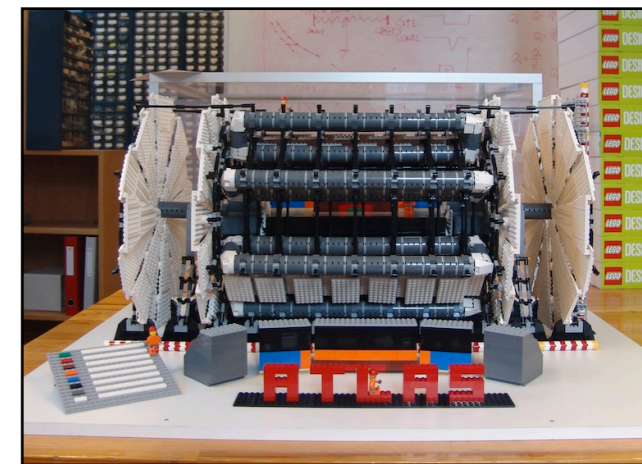
**LEGO bricks** are know and loved by (essentially) everyone and **create attention/interest**

Gets you in touch even with science-averse people

Models themselves can be **educative** and **give perspective** in terms of size and complexity of nowadays experiments

Highlight major components of experiment and in scale to LEGO figure

Workshops and competitions directly involve visitors, appeal to their creativity and can relate them to the experiment



Nathan Radioff

## 'Build Your Own Particle Detector' as an example

### BYOPD workshops

#### Closed-group activity

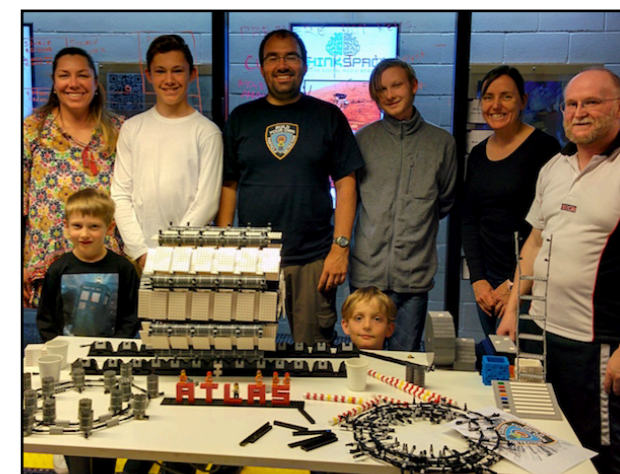
Combine **short lectures** about particle physics and ATLAS with the **construction of a large LEGO model**

While building the model they learn about the parts they are currently working on and questions are addressed in an open discussion/chat

10 to 15 students take about a day to build the model from scratch

**Hands-on** activity in a **relaxed** environment

**Active participation** and **visible result** help to make it a fun and memorable activity



## 'Build Your Own Particle Detector' as an example

### BYOPD competitions

#### Open-event activity

Participants are asked to **build what they think a particle detector looks like** and name their design

Creates **lots of attention**, but main outreach aim is to **talk to the participants** (and/or their companion/parents) and get them involved in a **discussion about physics and detectors**

chat about what it is they build and how it's similar/different to our experiments

what kind of particles they and we are looking for

**Active participation, visible result**, a souvenir and the chance to **win a price** make it memorable and fun





## Summary

Make it easier and **more attractive/rewarding** for (young) scientists to do outreach

Make outreach be **engaging, interactive, entertaining** and **fun**, yet **scientific**

Two examples of how **ATLAS approaches** outreach as a collaboration and which approach I took with the **Build Your Own Particle Detector** programme

