



## BUILD YOUR OWN PARTICLE DETECTOR A PARTICLE PHYSICS OUTREACH PROGRAMME

[HTTP://WWW.BUILD-YOUR-OWN-PARTICLE-DETECTOR.ORG/](http://www.build-your-own-particle-detector.org/)

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### Introduction

- project to grasp people's attention and get them involved
- started out with design/construction of LEGO ATLAS detector

### LEGO Models

- *simple*, catchy and reasonably affordable models enable people to get idea of size, complexity and structure of detectors
- give everybody chance to take part in construction of *detectors*

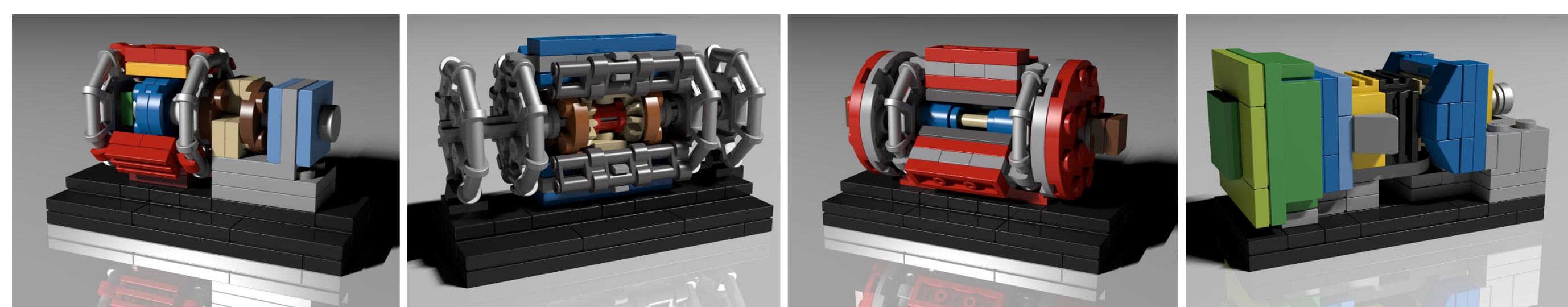
### ATLAS LEGO Model

- designed and built in 2011 at Niels Bohr Institute, Copenhagen
- ~48h to design, ~33h to build, ~9500 pieces of 201 different types, ~1 m x ~50 cm x ~50 cm in size, ~1:50 in scale to mini-fig
- smaller 560-pieces version went into LEGO review (declined) and exists in > 100 copies worldwide
- Nobel laureates Peter Higgs and François Englert signed parts of large ATLAS LEGO model (also in support of the idea)
- large model used for several in-depth particle-physics building sessions for high-school students



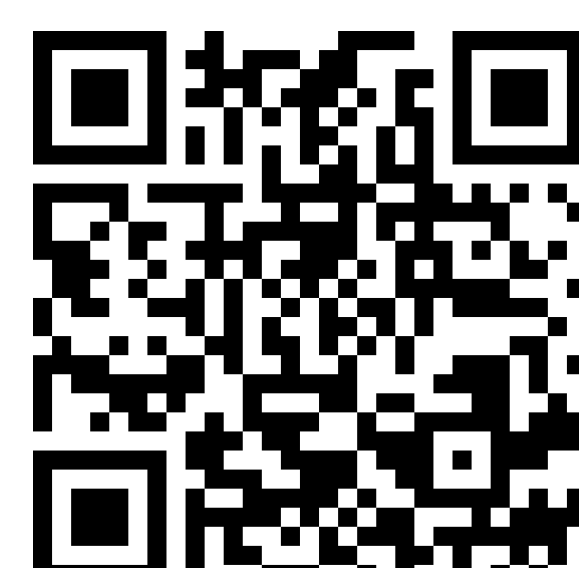
### Large Hadron Collider Micro Models

- models of main LHC experiments (ALICE, ATLAS, CMS, LHCb)
- designed by Nathan Readoff of University of Liverpool in 2014
- each model fits into palm of hand, yet features essentially all main components of experiments
- 371 pieces, < 10 min to build each model
- recently qualified for LEGO review to become official set



### Acknowledgements and Links

Thanks to the Niels-Bohr-Institute HEP group and the ATLAS Collaboration for their initial and continued support as well as to all volunteers that helped out during BYOPD events. Credits for the LHC micro models to Nathan Readoff and for the CMS models to Jaime Gomez, Jeff Temple and Marguerite Tonjes.



[1] 'Build Your Own Particle Detector' web site  
<https://build-your-own-particle-detector.org/>



[2] 'Build Your Own Particle Detector' Facebook page  
<https://www.facebook.com/BuildYourOwnParticleDetector>

### Build Your Own Particle Detector

- idea born in mid 2013, to get visitors actively involved
- BYOPD evolved to be hub for events and various LEGO-made detector models (ALICE, ATLAS, CMS, LHCb)
- > 15 BYOPD events with > 50 students building the large ATLAS model and > 600 participants in competitions in past four years

### Public Events

- mix active participation in design and building competition with chance to talk about particle physics in relaxed environment
- provide LEGO for multiple people to design and build at the same time and enough volunteers to entertain and educate participants and their company
- proved to work very well for all target audiences and age groups
- participants asked to design, build and name a "particle detector", or whatever they think a "particle detector" looks like
- volunteers have chance to discuss design and operation of both the participant's design and real experiments
- participants enter competition with an identifiable image of their design and by filling a form on BYOPD web site [1].
- best and most witty models selected based on picture and name
- prizes usually sent out by regular mail within the following week
- immediate small rewards shown to motivate participation



### Web and Social-Media Activity

- BYOPD web site [1] is central hub for all activities
- Facebook page [2] used for additional awareness, news distribution, fan involvement and online audience awards
- web site and Facebook page extend experience for individual participants and help to turn events into long-lasting memory

### Summary and Outlook

- using LEGO to build models of particle physics experiments proven to be perfect way to grasp people's attention
- LEGO models used for variety of outreach activities worldwide
- inviting groups of students to build detector models as part of an intense outreach event or calling a broader audience to take part in competitions creates a unique setting to convey knowledge in particle physics
- "Build Your Own Particle Detector" programme is looking forward to many more events, creative and fun ideas of people taking part in the competitions to get people interested in and fascinated by particle physics

More details can be found  
in ATLAS Outreach publication  
**ATL-OREACH-PUB-2015-001.**

