Reusable Science

Metadata Workshop e-infrastructures Austria

Tim Head

Wild Tree Tech

22 June 2016

Science makes progress when ...

... yesterday's Nobel Prize becomes boring.

The Nobel Prize for physics is in this year given for the invention of the maser and the laser.

— *B. Edlén, 1964*

PHYSICAL REVIEW VOLUME 99, NUMBER 4 AUGUST 15, 1955

The Maser—New Type of Microwave Amplifier, Frequency Standard, and Spectrometer*†

J. P. Gordon,‡ H. J. Zeiger,§ and C. H. Townes
Columbia University, New York, New York

(Received May 4, 1955)

A type of device is described which can be used as a microwave amplifier, spectrometer, or oscillator. Experimental results are given. When operated as a spectrometer, the device has good sensitivity, and, by eliminating the usual Doppler broadening, a resolution of 7 kc/sec has been achieved. Operated as an oscillator, the device produced a frequency stable to at least 4 parts in 10^{12} in times of the order of a second, and stable over periods of an hour or more to at least a part in 10^{10}. The device is examined theoretically, and results are given for the expected sensitivity of the spectrometer, the stability and purity of the oscillation, and the noise figure of the amplifier. Under certain conditions a noise figure approaching the theoretical limit of unity, along with reasonably high gain, should be attainable.

This year's Nobel prize in physics is shared between three scientists - Nicolaas Bloembergen and Arthur Schawlow, both from the United States, and Kai Siegbahn from Sweden - for their contributions to the development of two important spectroscopic methods - **laser spectroscopy** and electron spectroscopy.

— *Ingvar Lindgren, 1981*

The Royal Swedish Academy of Sciences has decided to award this year's Nobel Prize for Physics jointly to three physicists for "development of methods to cool and trap atoms with **laser light**".

— *Bengt Nagel, 1997*

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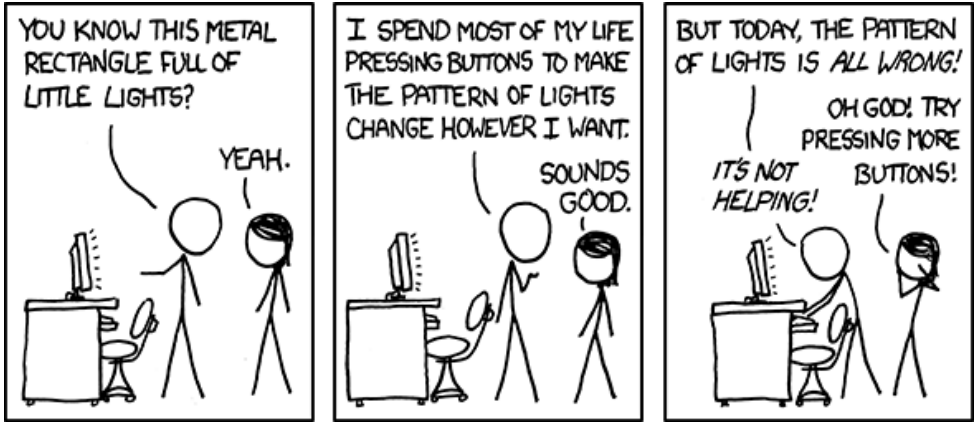
Observation of a New Particle in the Search for the Standard Model Higgs Boson with the ATLAS Detector at the LHC

The ATLAS Collaboration

This paper is dedicated to the memory of our ATLAS colleagues who did not live to see the full impact and significance of their contributions to the experiment.

Abstract

A search for the Standard Model Higgs boson in proton-proton collisions with the ATLAS detector at the LHC is presented. The datasets used correspond to integrated luminosities of approximately 4.8 fb^{-1} collected at $\sqrt{s}$ = 7 TeV in 2011 and 5.8 fb^{-1} at $\sqrt{s}$ = 8 TeV in 2012. Individual searches in the channels $H \to ZZ^{(*)} \to 4\ell$, $H \to \gamma\gamma$ and $H \to WW^{(*)} \to e\nu\mu\nu$ in the 8 TeV data are combined with previously published results of searches for $H \to ZZ^{(*)}$, $WW^{(*)}$, $b\bar{b}$ and $\tau^+\tau^-$ in the 7 TeV data and results from improved analyses of the $H \to ZZ^{(*)} \to 4\ell$ and $H \to \gamma\gamma$ channels in the 7 TeV data. Clear evidence for the production of a neutral boson with a measured mass of 126.0 $\pm$ 0.4 (stat) $\pm$ 0.4 (sys) GeV is presented. This observation, which has a significance of 5.9 standard deviations, corresponding to a background fluctuation probability of 1.7×10^{-9}, is compatible with the production and decay of the Standard Model Higgs boson.


YOU KNOW THIS METAL RECTANGLE FULL OF LITTLE LIGHTS?
YEAH.
I SPEND MOST OF MY LIFE PRESSING BUTTONS TO MAKE THE PATTERN OF LIGHTS CHANGE HOWEVER I WANT.
SOUNDS GOOD.
BUT TODAY, THE PATTERN OF LIGHTS IS ALL WRONG!
OH GOD! TRY PRESSING MORE BUTTONS!
IT'S NOT HELPING!

... but why?

Diversity!

Solution: publish everything!

The Narrative

journals, pre-prints, blogs, ...

The Code

github + zenodo

The Data

figshare, re3data, zenodo, ...

The Environment?

The Environment!

The Environment!

In the form of a DOCKERFILE

Demo

sourmash - https://github.com/dib-lab/sourmash

LIGO - https://github.com/minrk/ligo-binder

Machine-learning - http://betatim.github.io/posts/stop-ensemble-growth-early/

Interjection: Training

Prototyping Solutions

Binder

Everware

Everpub

Advertising: I work on two of these, they are open-source, join us!

What is it good for?

- Attempting to reuse other people's work becomes cheap again
- Alternative metrics for research impact
- The Interactive Publication
- Open-source philosophy applied to science

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Tim Head

tim@wildtreetech.com

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