

**Lars Holm Nielsen**

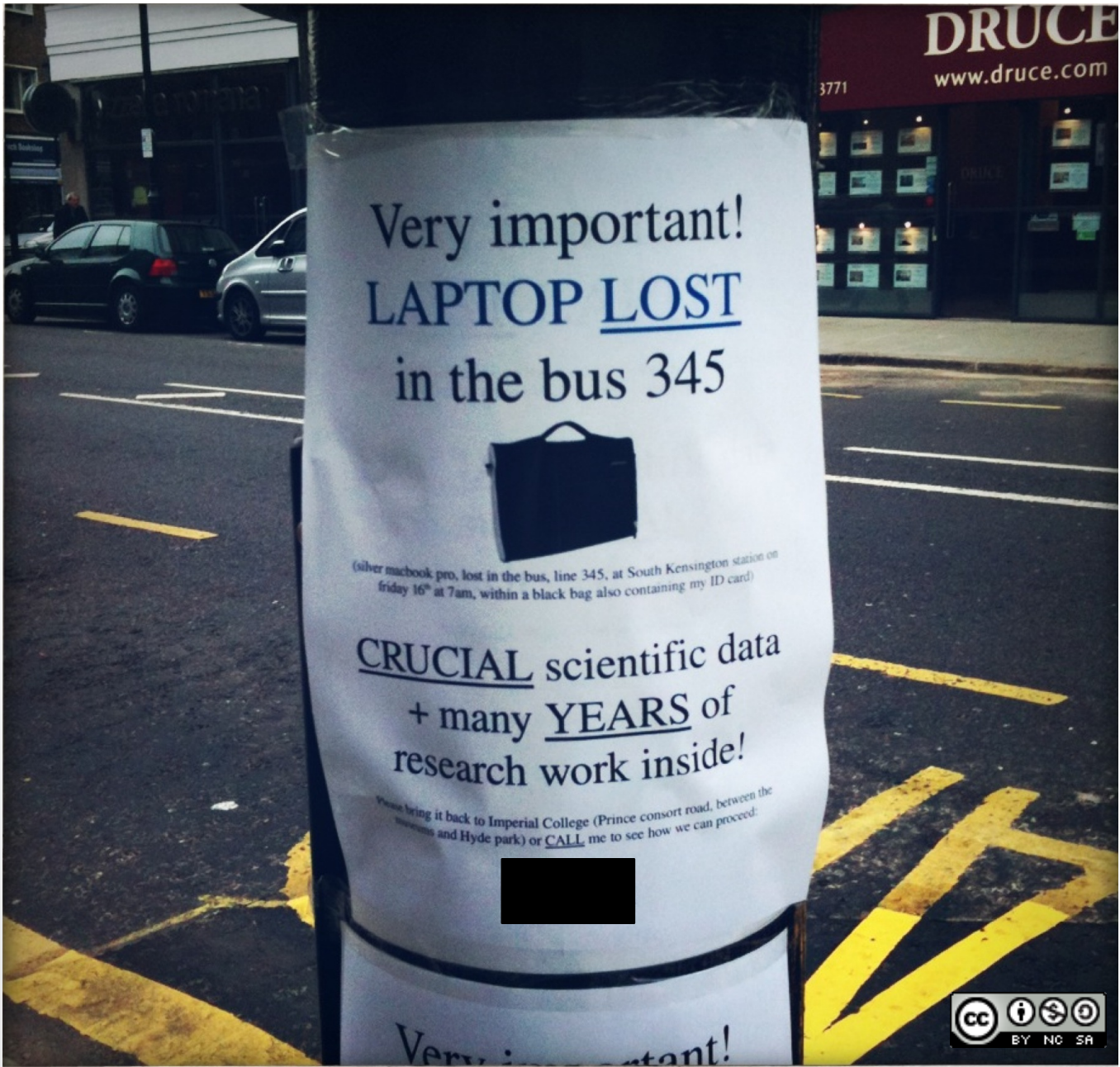
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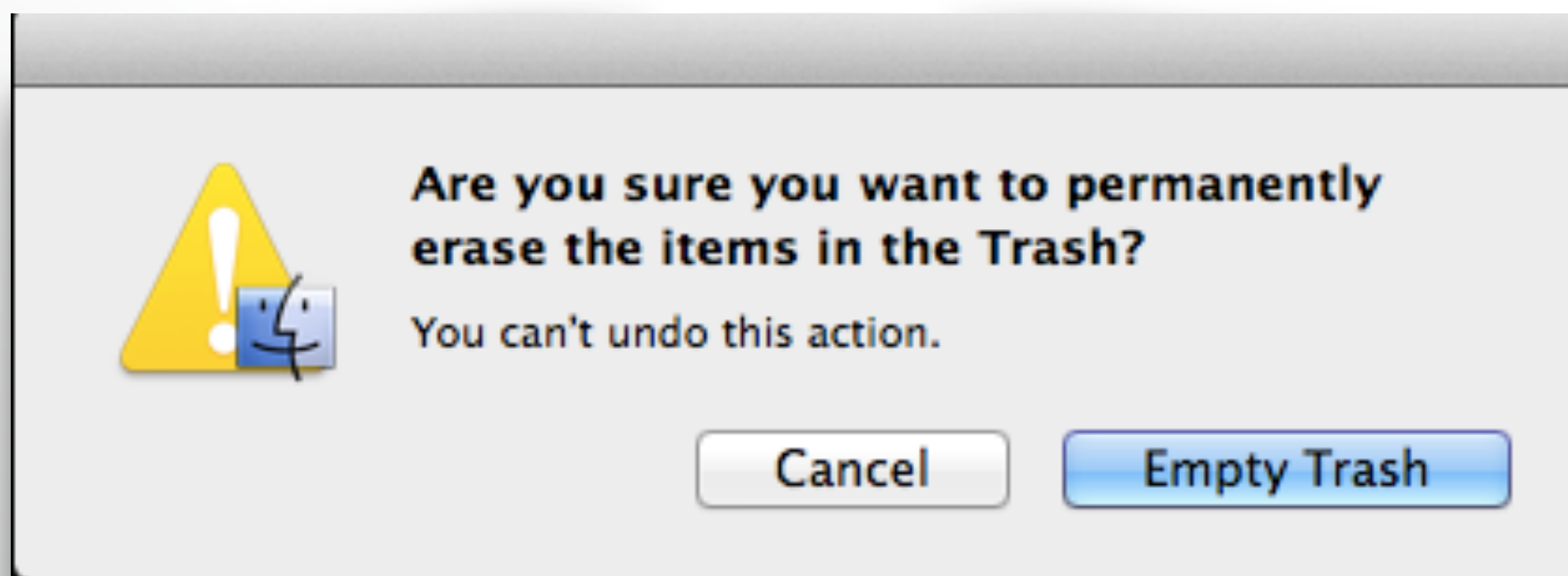
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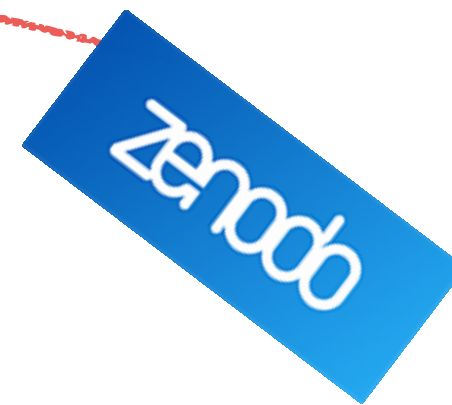
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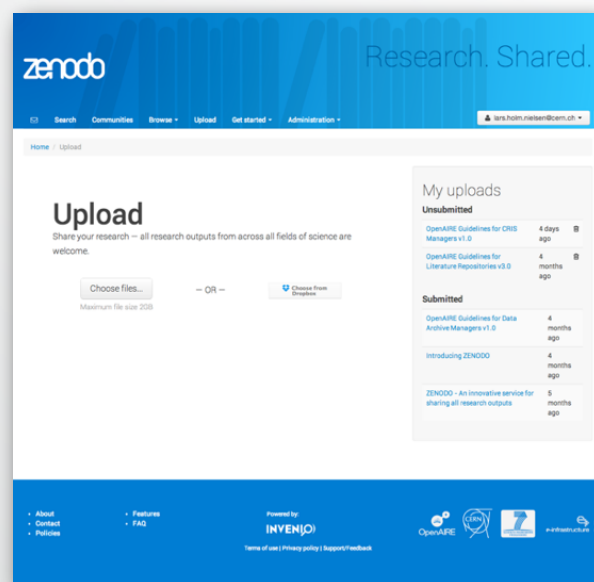
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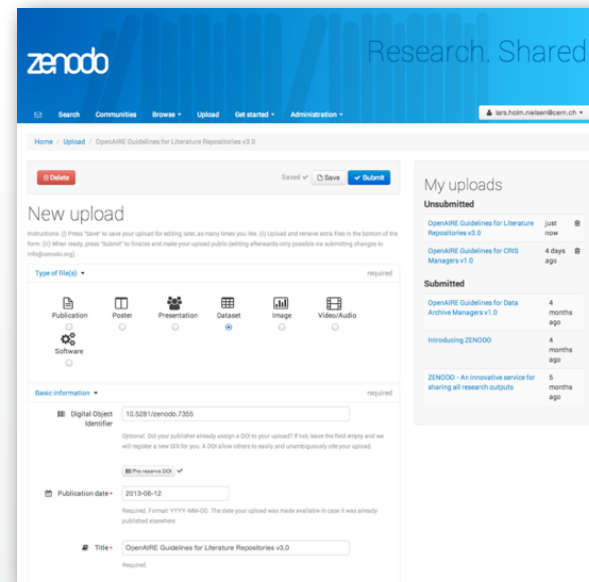




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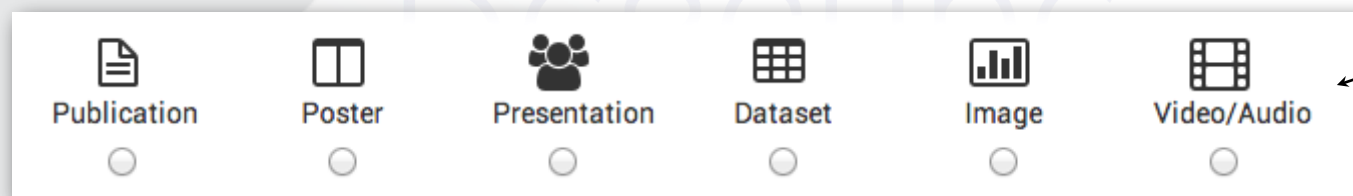
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27 July 2011

Journal article Open access

Branch-specific plasticity enables self-organization of nonlinear computation in single neurons

Legenstein, Robert; Maass, Wolfgang

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It has been conjectured that nonlinear processing in dendritic branches endows individual neurons with the capability to perform complex computational operations that are needed in order to solve for example the binding problem. However, it is not clear how single neurons could acquire such functionality in a self-organized manner, since most theoretical studies of synaptic plasticity and learning concentrate on neuron models without nonlinear dendritic properties. In the meantime, a complex picture of information processing with dendritic spikes and a variety of plasticity mechanisms in single neurons has emerged from experiments. In particular, new experimental data on dendritic branch strength potentiation in the hippocampus have not yet been incorporated into such models. In this article, we investigate how experimentally observed plasticity mechanisms, such as depolarization-dependent STDP and branch-strength potentiation, could be integrated to self-organize nonlinear neural computations with dendritic spikes. We provide a mathematical proof that in a simplified setup these plasticity mechanisms induce a competition between dendritic branches, a novel concept in the analysis of single neuron adaptivity. We show via computer simulations that such dendritic competition enables a single neuron to become member of several neuronal ensembles, and to acquire nonlinear computational capabilities, such as for example the capability to bind multiple input features. Hence, our results suggest that nonlinear neural computation may self-organize in single neurons through the development of local synaptic and dendritic plasticity mechanisms.

Preview

1 / 16

Development/Plasticity/Repair

Branch-Specific Plasticity Enables Self-Organization of Nonlinear Computation in Single Neurons

Robert Legenstein and Wolfgang Maass

Institute for Theoretical Computer Science, University of Vienna, Vienna, Austria

It has been conjectured that nonlinear processing in dendritic branches endows individual neurons with the capability to perform complex computational operations that are needed in order to solve for example the binding problem. However, it is not clear how single neurons could acquire such functionality in a self-organized manner, since most theoretical studies of synaptic plasticity and learning concentrate on neuron models without nonlinear dendritic properties. In the meantime, a complex picture of information processing with

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2. extend the interoperability and integration with emerging computing models,

3. strengthen the reliability and manageability of the services and establish a sustainable model to support,

4. harmonise and evolve the middleware, ensuring it responds effectively to the requirements of the scientific communities relying on it.

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## The 13th HITRAN Database Conference

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**A Global Fitting Approach For Doppler Broadening Thermometry**  
Amodio, Pasquale ; Moretti, Luigi ; De Vizia, Maria Domenica ; Gianfrani, Livio

Very recently, a spectroscopic determination of the Boltzmann constant,  $k_B$ , has been performed at the Second University of Naples by means of a rather sophisticated implementation of Doppler Broadening Thermometry (DBT)1. Performed on a 180-enriched ...

Uploaded by CfA Library on 05 September 2014.

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The 13th HITRAN Database Conference, held June 23-25, 2014, at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, USA.

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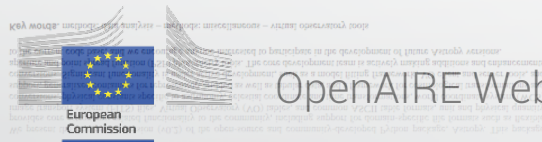
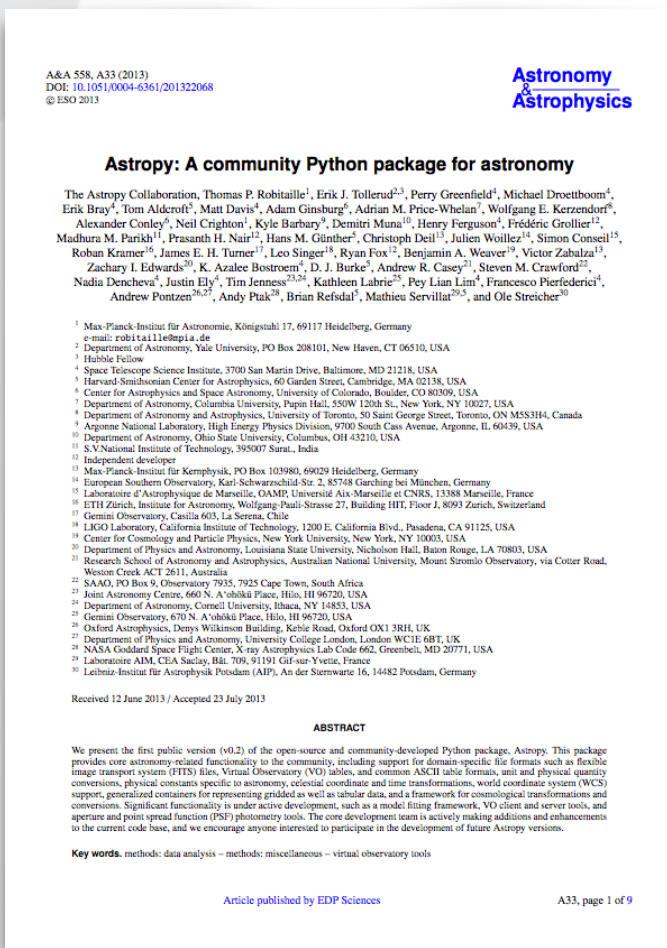
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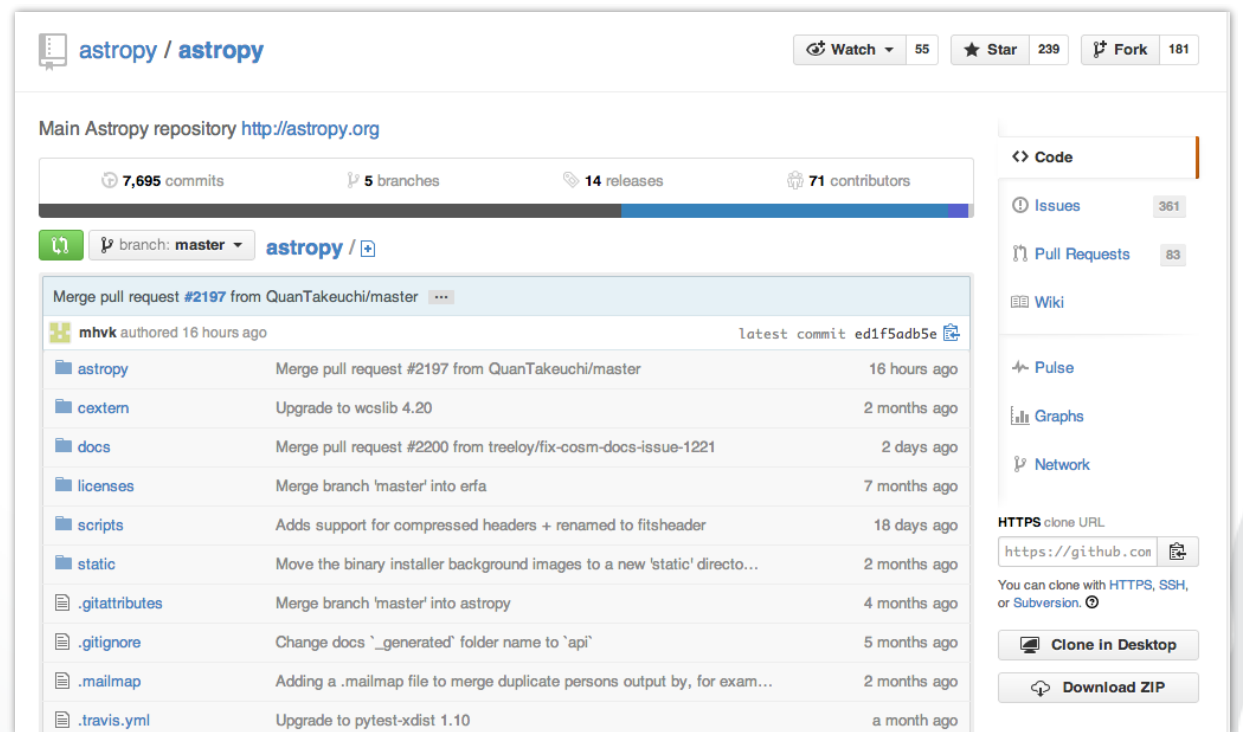
Title:



Paper: Astropy: A community Python package for astronomy (doi:10.1051/0004-6361/201322068)

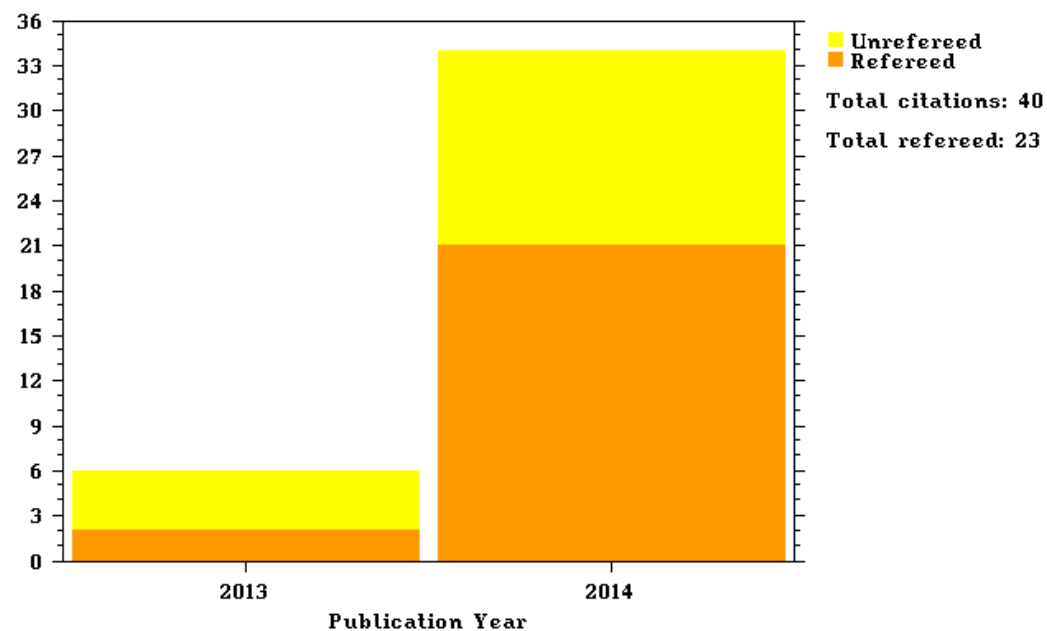


OpenAIRE Webinar, 23 October 2014





## Astropy: A community Python package for astronomy

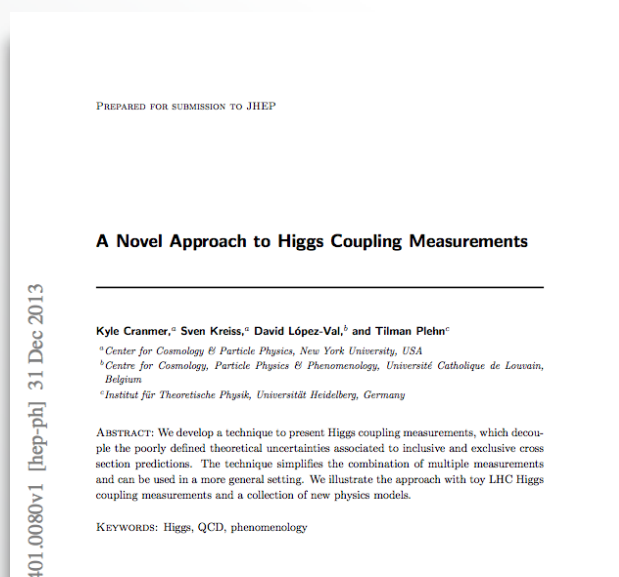


**Key words:** methods: data analysis—methods: miscellaneous—virtual observatory tools

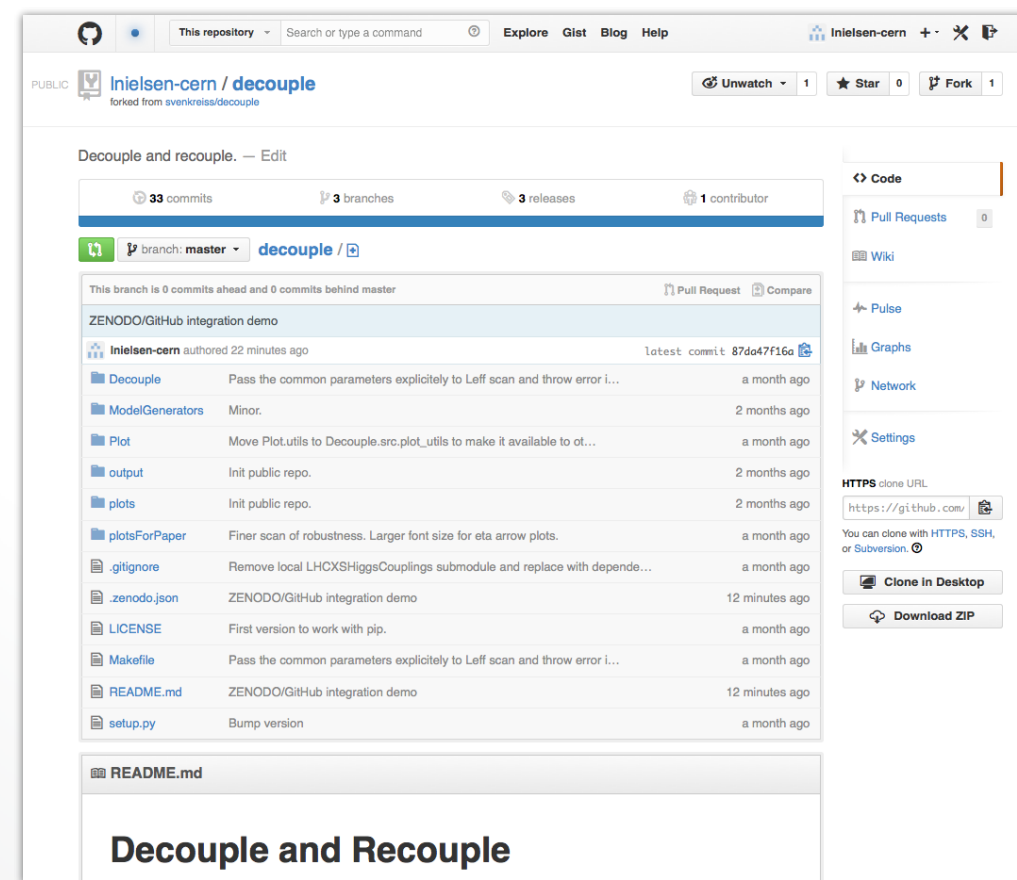
A33, page 1 of 9



# Software citation



[25] K. Cranmer, S. Kreiss, D. López-Val, T. Plehn,  
<https://github.com/svenkreiss/decouple>.



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Decouple

ModelGenerators

Plot

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Makefile

README.md

setup.py

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# Software meets INSPIRE



07 March 2014

decouple software associated to arXiv:1401.0080

Cranmer, Kyle; Kreiss, Sven

This repository contains the software implementation for our paper **A Novel Approach to Higgs Coupling Measurements** (Cranmer, Kreiss, Lopez-Val, Plehn), arXiv:1401.0080. It contains tools to apply the discussed methods to new models and contains a Makefile to recreate the plots in the paper.

A demo for the recoupling stage where the effective likelihood and template parametrization are readily provided is at decoupledDemo.

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Cranmer, Kyle; Kreiss, Sven (New York University)

Cite as: ( 2013 ) Zenodo, <http://doi.org/10.5281/zenodo.8475>

**Description:**

This repository contains the software implementation for our paper **A Novel Approach to Higgs Coupling Measurements** (Cranmer, Kreiss, Lopez-Val, Plehn), arXiv:1401.0080 [hep-ph]. It contains tools to apply the discussed methods to new models and contains a Makefile to recreate the plots in the paper.

A demo for the recoupling stage where the effective likelihood and template parametrization are readily provided is at decoupledDemo.

This dataset complements the following publication:  
[A Novel Approach to Higgs Coupling Measurements](#)

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**A Novel Approach to Higgs Coupling Measurements**

Kyle Cranmer, Sven Kreiss (New York U., CERN), David Lopez-Val (Louvain U., CP3), Tilman Plehn (U. Heidelberg, ITP)

Dec 30, 2013 - 39 pages

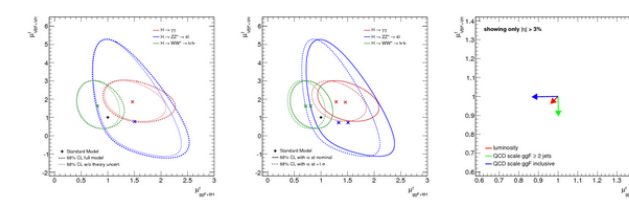
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**Abstract (arXiv)**

We develop a technique to present Higgs coupling measurements, which decouple the poorly defined theoretical uncertainties associated to inclusive and exclusive cross section predictions. The technique simplifies the combination of multiple measurements and can be used in a more general setting. We illustrate the approach with toy LHC Higgs coupling measurements and a collection of new physics models.

**Note:** 39 pages, 12 figures

**Keyword(s):** INSPIRE: \*Automatic Keywords\* | coupling: Higgs | CERN LHC Coll | new physics | decoupling



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