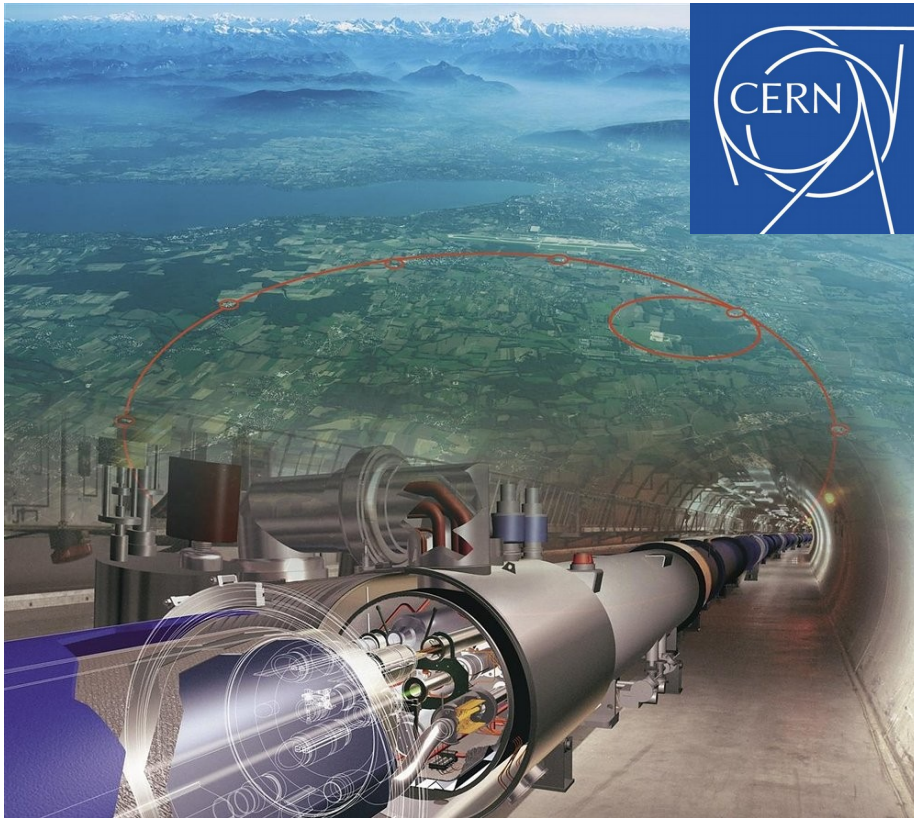


Paperscape

Workshop Publikationsnetzwerk
Max Planck Digital Library
2 May 2017

Robert Knegjens

Background: High Energy Physics



Large Hadron Collider,
CERN, Geneva

PhD: 2010-2014 @



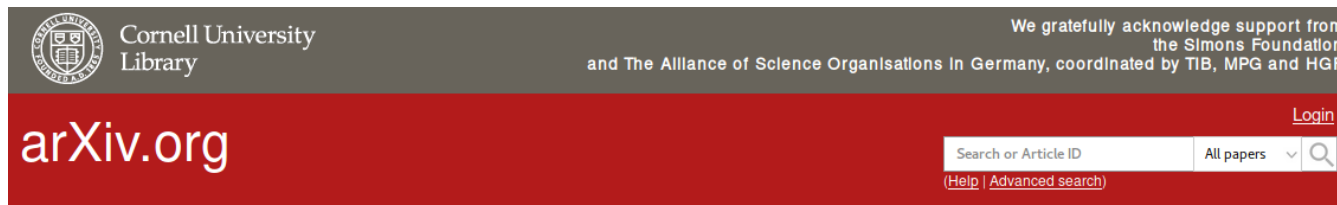
Dutch National Institute
for Subatomic Physics



Damien George
Paperscape co-creator
(postdoc Nikhef 2010-2012)

The ArXiv

- Created by Paul Ginsparg in 1991 to share **pre-print (HEP) papers**
- Now **1 million+ scientific papers** in physics, maths, computer science, ...
- ~300 new papers / day



Open access to 1,258,265 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics

Subject search and browse:

20 Apr 2017: [Applied Physics subject area added to arXiv](#)

10 Mar 2017: [New members join arXiv Member Advisory Board](#)

06 Mar 2017: [arXiv Scientific Director Search](#)

10 Feb 2017: [Attention Submitters: our TeX processing system has been updated](#)

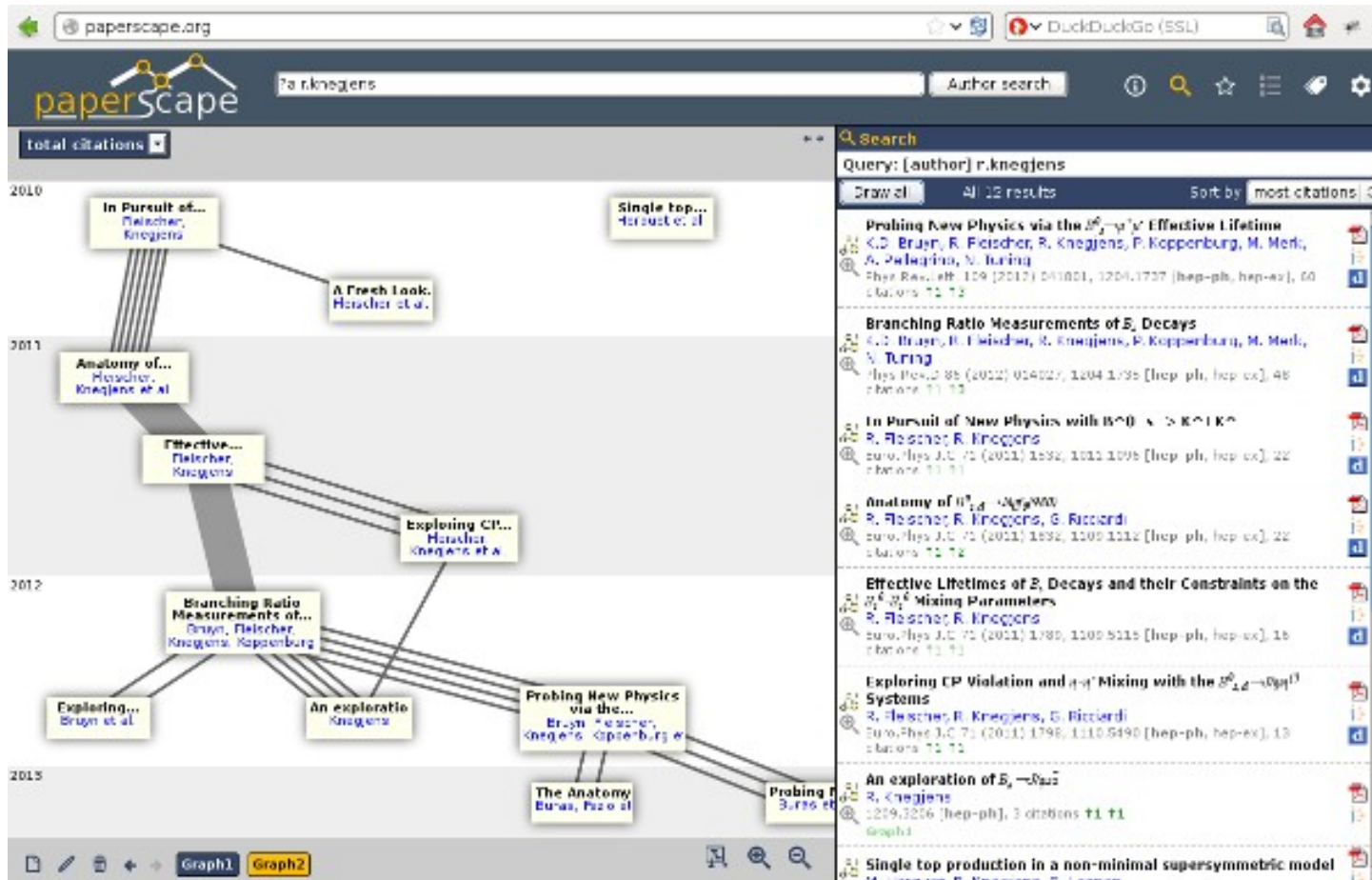
See cumulative "What's New" pages. Read [robots beware](#) before attempting any automated download

Physics

- [Astrophysics \(astro-ph new, recent, find\)](#)
includes: [Astrophysics of Galaxies](#); [Cosmology and Nongalactic Astrophysics](#); [Earth and Planetary Astrophysics](#); [High Energy Astrophysical Phenomena](#); [Instrumentation and Methods for Astrophysics](#); [Solar and Stellar Astrophysics](#)
- [Condensed Matter \(cond-mat new, recent, find\)](#)
includes: [Disordered Systems and Neural Networks](#); [Materials Science](#); [Mesoscale and Nanoscale Physics](#); [Other Condensed Matter](#); [Quantum Gases](#); [Soft Condensed Matter](#); [Statistical Mechanics](#); [Strongly Correlated Electrons](#); [Superconductivity](#)
- [General Relativity and Quantum Cosmology \(gr-qc new, recent, find\)](#)
- [High Energy Physics - Experiment \(hep-ex new, recent, find\)](#)
- [High Energy Physics - Lattice \(hep-lat new, recent, find\)](#)
- [High Energy Physics - Phenomenology \(hep-ph new, recent, find\)](#)
- [High Energy Physics - Theory \(hep-th new, recent, find\)](#)
- [Mathematical Physics \(math-ph new, recent, find\)](#)
- [Nonlinear Sciences \(nlin new, recent, find\)](#)
includes: [Adaptation and Self-Organizing Systems](#); [Cellular Automata and Lattice Gases](#); [Chaotic Dynamics](#); [Exactly Solvable and Integrable Systems](#); [Pattern Formation and Solitons](#)
- [Nuclear Experiment \(nucl-ex new, recent, find\)](#)
- [Nuclear Theory \(nucl-th new, recent, find\)](#)

Navigating a large citation network

~300gb arXiv source files → citation graph

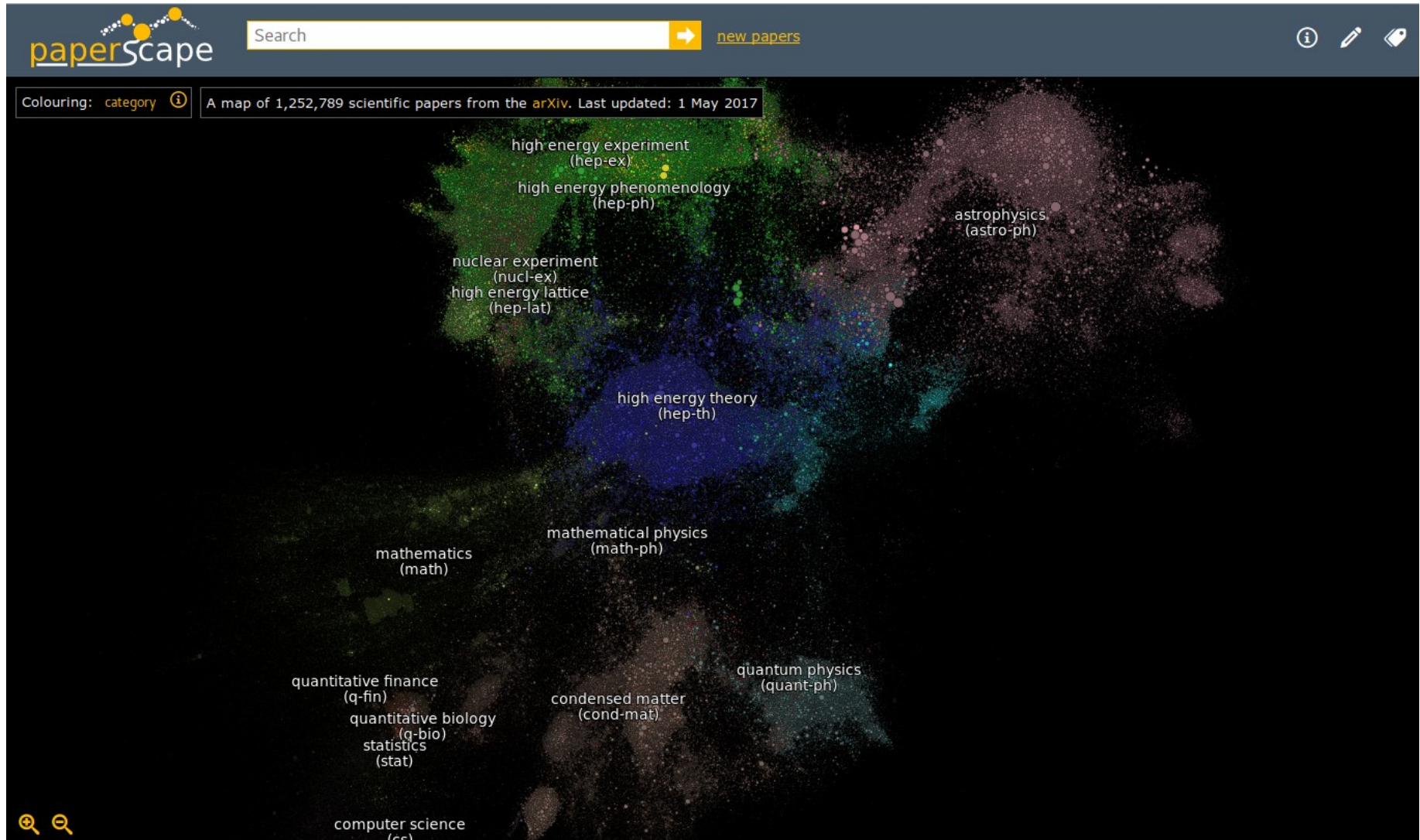


First version of Paperscape:
**Interactively
navigate sub-
graphs**

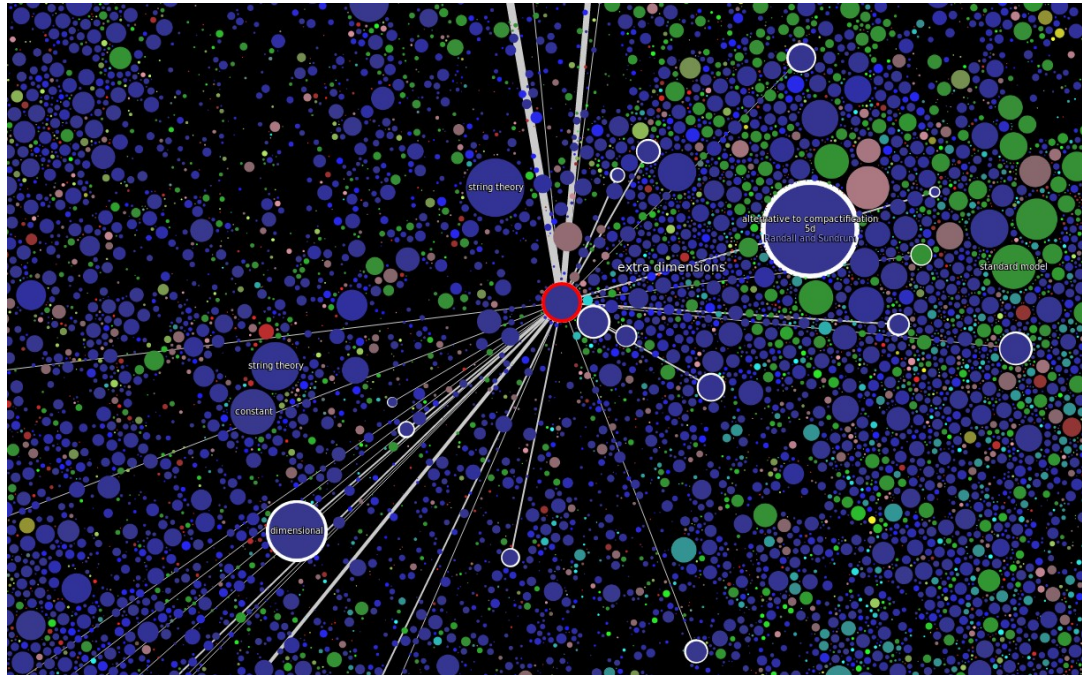
(my.paperscape.org)

The Paperscape map (I)

Interactive map (pan/zoom/click) of all 1 million+ arXiv papers (paperscape.org)



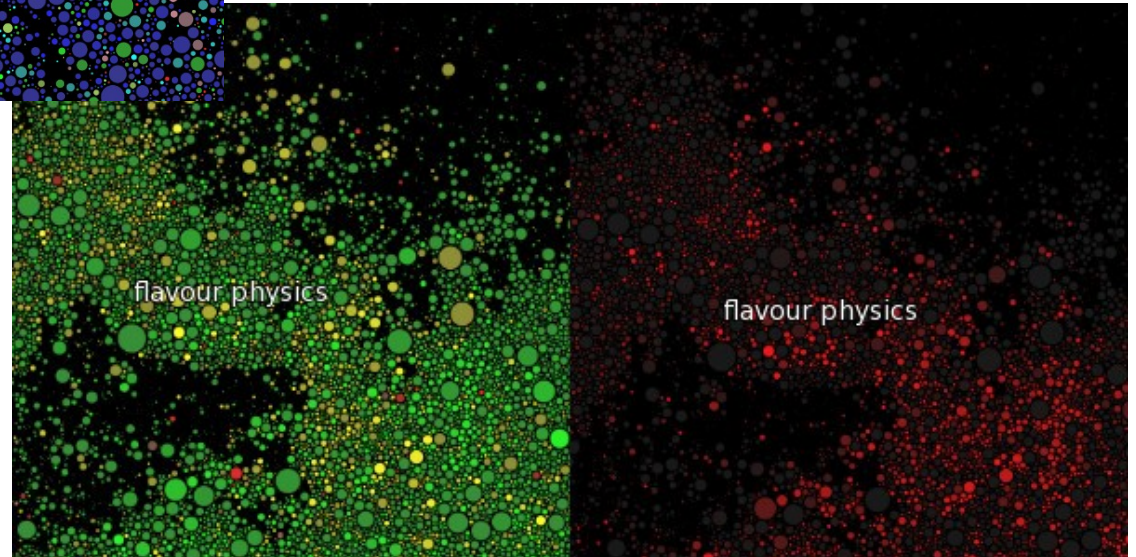
The Paperscape map (II)



- Papers represented as **circles**
- **Size of paper** proportional to citation count (~**impact**)
- Paper colouring: **category** or **age** (heatmap)
- Papers **clustered** (grouped) by how they **reference each other**

Specifically: N-body simulation:

- Mass proportional to size
- **2D anti-gravity force** pushes masses apart
- **References act as spring forces** pulling papers together



Reception

IOP Physics World - the member magazine of the Institute of Physics

physicsworld.com

Home News Blog Multimedia In depth Events

brightrecruits

Recent entries

- Welcome to the *arXiv* galaxy
- Why are school pupils flocking to physics?
- Australian science communicator Peter Pockley dies
- Fuel cell powers rock guitarist
- Physics World* 2013 Focus on Vacuum Technology is out now

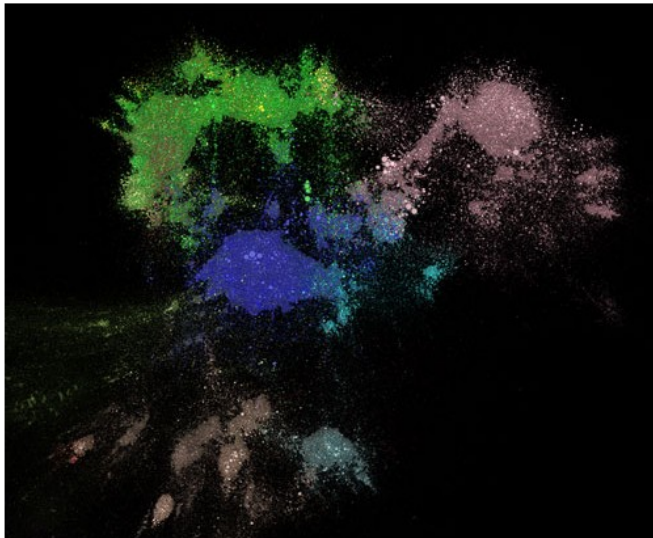
Popular tags

- Facebook poll
- particle physics
- LHC
- science and society
- astronomy
- CERN
- out and about
- Physics World magazine
- quantum computers
- conference
- Higgs boson
- NASA
- South Korea
- planets
- quantum physics
- science communication
- history of physics
- space
- quantum theory

Blog

Welcome to the *arXiv* galaxy

Posted on Aug 16, 2013 3:27 pm



Visualizing the interactive *arXiv* landscape. (Courtesy: Damien George, Rob Kneijens)

By **Matthew Chalmers**

With almost a million articles accrued over the past two decades, the *arXiv* preprint server has become an indispensable tool for physicists.



Sean Carroll
@seanmcarroll

Following

The Paperscape map of the physics literature is really quite amazing.
preposterousuniverse.com/blog/2013/08/1...

Reply Retweet Favorite More

16
RETWEETS

9
FAVORITES



theguardian

News Sport Comment Culture Business Money Life & style

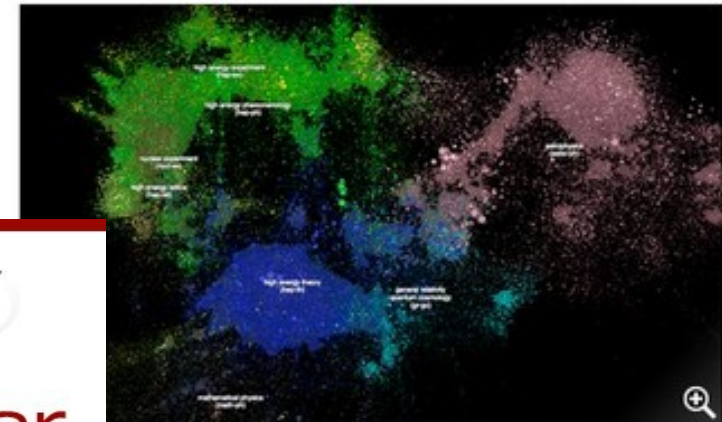
News Science Particle physics

Paperscape maps a dazzling universe of scientific research

Its creators used an algorithm that simulates the formation of galaxies, replacing stars with scientific papers on arXiv database

Damien George and Rob Kneijens
theguardian.com, Thursday 5 September 2013 07:00 BST

Jump to comments (0)

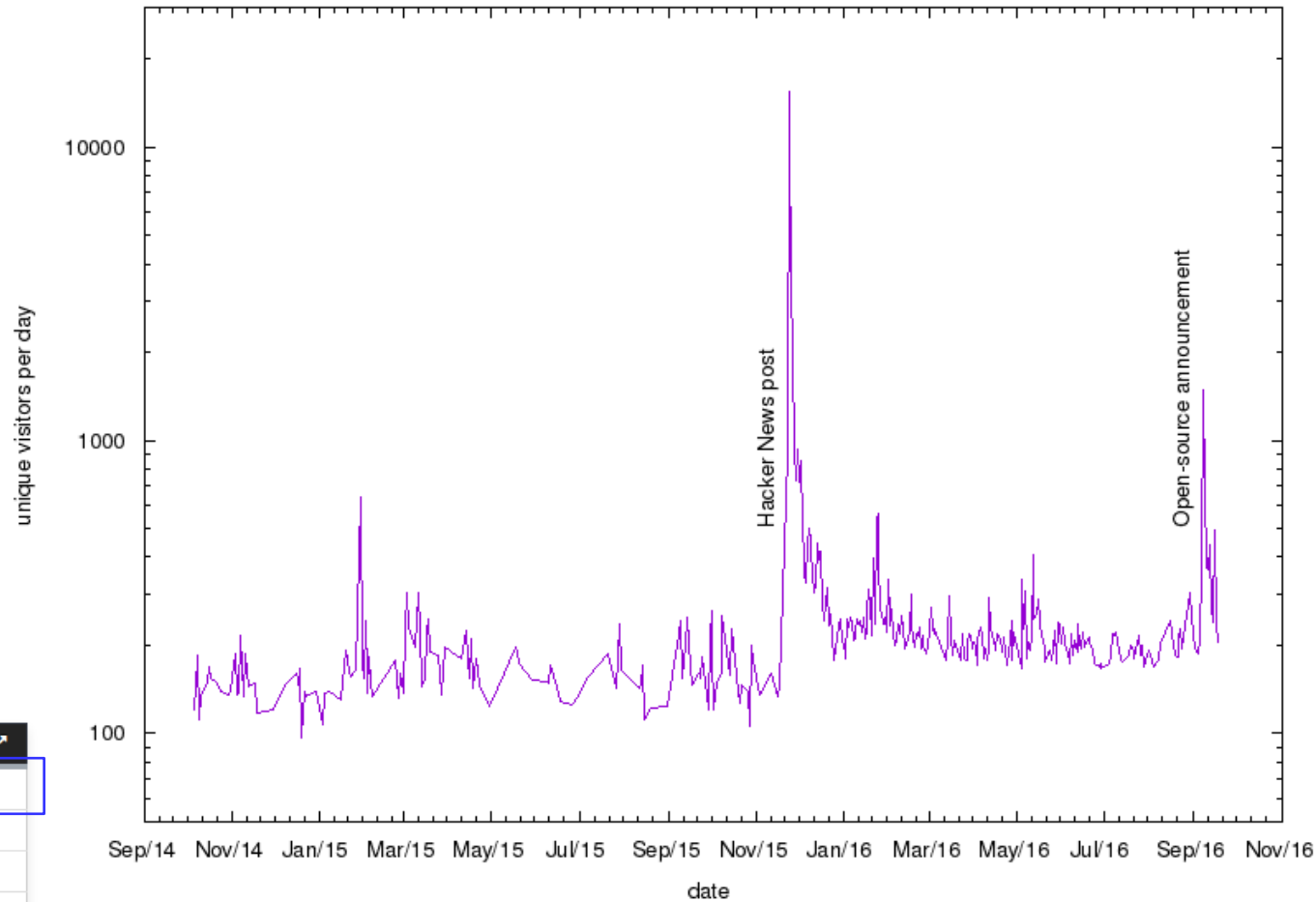


The interactive map of scientific research papers on arXiv. Image: [unreadable]

Hacker News



Usage statistics



| Visitors | Hits | % | Bandwidth | Geo Location |
|----------|-----------|--------|------------|---------------------|
| 56,825 | 1,065,015 | 50.42% | 7.15 GiB | EU Europe |
| 68,693 | 689,754 | 32.65% | 9.42 GiB | NA North America |
| 28,170 | 215,733 | 10.21% | 4.67 GiB | AS Asia |
| 3,892 | 84,771 | 4.01% | 434.73 MiB | SA South America |
| 2,288 | 43,182 | 2.04% | 273.22 MiB | OC Oceania |
| 659 | 13,277 | 0.63% | 47.67 MiB | AF Africa |
| 58 | 542 | 0.03% | 2.04 MiB | -- Location Unknown |
| 1 | 16 | 0.00% | 90.00 KiB | AN Antarctica |

13,645 total unique daily hits (over 2 years) from **97** Max Planck IP addresses

| Visitors | Hits | % | Bandwidth | Geo Location |
|----------|-----------|--------|-------------|-----------------------|
| 56,825 | 1,065,015 | 50.42% | 7.15 GiB | EU Europe |
| 9,699 | 201,243 | 9.53% | 1.30 GiB | DE Germany |
| 6,355 | 139,863 | 6.62% | 812.54 MiB | GB United Kingdom |
| 6,764 | 131,079 | 6.21% | 834.18 MiB | RU Russian Federation |
| 5,227 | 96,132 | 4.55% | 1018.98 MiB | FR France |
| 3,647 | 68,428 | 3.24% | 244.02 MiB | NL Netherlands |

Paperscape links

- Paperscape map: paperscape.org
- My Paperscape (v1): my.paperscape.org
- Development blog: blog.paperscape.org
- Paperscape on Github:
 - Back-end code: github.com/paperscape/paperscape-backend
 - Front-end code: github.com/paperscape/paperscape-mapclient
 - ArXiv citation graph (as extracted by Paperscape):
github.com/paperscape/paperscape-data