

IEEE NSS 2017

Atlanta, GA, USA

27 October 2017



Ghost Science

T. Basaglia, Z. W. Bell, A. Burger, P. V. Dressendorfer, M. G. Pia

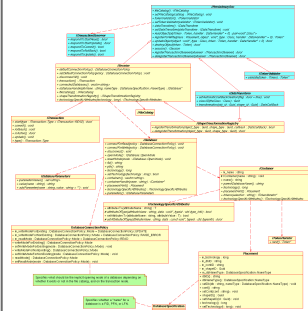
¹CERN, ²ORNL, ³Fisk Univ., ⁴IEEE, ⁵INFN Genova

Foreword

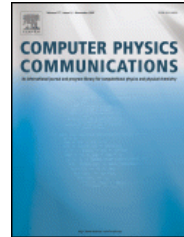
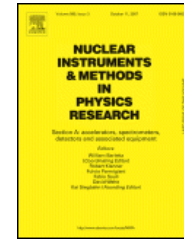
A small sample of scientometric results is summarized in this presentation

IEEE NSS 2007

```
<!-- parameters for the shaping amp -->  
<parameter name="StarFEEAmpRiseTime" type="double"> 42 </parameter>  
<parameter name="StarFEEAmpFallTime" type="double"> 42.3 </parameter>  
<parameter name="StarFEEAmpGain" type="double"> 3.3 </parameter>  
  
<!-- parameters for the ADC -->  
<parameter name="FlashADCGain" type="double"> 1.0 </parameter>  
<parameter name="FlashADCBitsPerSample" type="int"> 10 </parameter>  
  
<!-- parameters of the geometry of the readout pads -->  
<PadRowLayout2D type="FixedPadSizeDiskLayout"  
  rMin="320.0" rMax="1600.0"  
  padHeight="6.0" padWidth="2.0"  
  maxRow="200" padGap="0.0" />
```



```
Program Mesh  
use fgl  
implicit None  
  
integer i, j, N  
real z(30,30)  
  
c Create data for plotting  
do 100 i = 1, 30  
  do 200 j = 1, 30  
    z(i,j)=3.0*sin((i+1)/  
      + 4.0)*cos((j+1)/4.0)+2.0  
      + *sin((i+j)/4.0)  
  200 continue  
100 continue  
  
c Convert Fortran variable z  
c to mFArray using mf(z), and  
c call msMesh for Mesh plot  
call msMesh(mf(z))  
  
c Pause to display the graph  
call msViewPause()  
End Program Mesh
```



Writing software or writing scientific articles?

Maria Grazia Pia
INFN Genova, Italy

T. Basaglia (CERN), Z. Bell (ORNL),
P. Dressendorfer (IEEE), A. Larkin (IEEE)

IEEE Nuclear Science Symposium 2007
Honolulu, HI, USA

Thanks to A. Howard, J. Knobloch, S. Mele, J. Yeomans (CERN)



**CERN terminated the subscription to the
Web of Science in July 2017**

**The results presented here were obtained through
the INFN subscription to the Web of Science,
which has a limited scope**






**Journal Citation Reports (JCR)
is not included in INFN subscription**

<http://cds.cern.ch/record/2271834>

Caveat

- Flawed identification of conference proceedings and proper journal publications in the WoS
 - Some regular journal publications are flagged as conference proceedings, even if the published paper is not related to any conference at all
 - Some regular journal publications appear only in the Conference Proceedings Citation Index – Science database
 - Inconsistent number of citations in WoS (total and citation report)
- Publishers' search facilities may not be fully accurate
 - Used for full-text searches, which are not supported by the WoS
 - Some inconsistencies observed in our verification tests
 - Indicative of trends, rather than absolute measurements

Instrumentation & Instruments

- GEANT4-a simulation toolkit**
By: Agostinelli, S; Allison, J; Amako, K; et al.
NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS
SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 506 Issue: 3 Pages: 250-303
Published: JUL 1 2003
 [Full Text from Publisher](#) [View Abstract](#)
Times Cited: 8,422
(from Web of Science Core Collection)
Usage Count ▾
- ATHENA, ARTEMIS, HEPHAESTUS: data analysis for X-ray absorption spectroscopy using IFEFFIT**
By: Ravel, B; Newville, M
JOURNAL OF SYNCHROTRON RADIATION Volume: 12 Pages: 537-541 Part: 4 Published: JUL 2005
 [Full Text from Publisher](#) [View Abstract](#)
Times Cited: 4,800
(from Web of Science Core Collection)
Usage Count ▾
- WSXM: A software for scanning probe microscopy and a tool for nanotechnology**
By: Horcas, I.; Fernandez, R.; Gomez-Rodriguez, J. M.; et al.
REVIEW OF SCIENTIFIC INSTRUMENTS Volume: 78 Issue: 1 Article Number: 013705 Published: JAN 2007
 [Full Text from Publisher](#) [View Abstract](#)
Times Cited: 3,684
(from Web of Science Core Collection)
 **Highly Cited Paper**
Usage Count ▾
- PLS-regression: a basic tool of chemometrics**
By: Wold, S; Sjostrom, M; Eriksson, L
Conference: International Symposium on Partial Least Squares (PLS 99) Location: JOUY EN JOSAS, FRANCE Date: OCT, 1999
CHEMOMETRICS AND INTELLIGENT LABORATORY SYSTEMS Volume: 58 Issue: 2 Pages: 109-130
Published: OCT 28 2001
 [Full Text from Publisher](#) [View Abstract](#)
Times Cited: 3,227
(from Web of Science Core Collection)
Usage Count ▾
- PRINCIPAL COMPONENT ANALYSIS**
By: WOLD, S; ESBENSEN, K; GELADI, P
CHEMOMETRICS AND INTELLIGENT LABORATORY SYSTEMS Volume: 2 Issue: 1-3 Pages: 37-52
Published: AUG 1987
Times Cited: 2,936
(from Web of Science Core Collection)
Usage Count ▾

WoS 6 October 2017
Coverage:
1985-2016

Nuclear Science & Technology

1. GEANT4-a simulation toolkit

By: Agostinelli, S; Allison, J; Amako, K; et al.

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS
SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 506 Issue: 3 Pages: 250-303
Published: JUL 1 2003



[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **8,422**

(from Web of Science Core Collection)

Usage Count

2. ALGORITHMS FOR THE RAPID SIMULATION OF RUTHERFORD BACKSCATTERING SPECTRA

By: DOOLITTLE, LR

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION B-BEAM INTERACTIONS
WITH MATERIALS AND ATOMS Volume: 9 Issue: 3 Pages: 344-351 Published: 1985



[Full Text from Publisher](#)

Times Cited: **2,315**

(from Web of Science Core Collection)

Usage Count

3. Luminescence dating of quartz using an improved single-aliquot regenerative-dose protocol

By: Murray, AS; Wintle, AG

RADIATION MEASUREMENTS Volume: 32 Issue: 1 Pages: 57-73 Published: FEB 2000



[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **2,279**

(from Web of Science Core Collection)

Usage Count

4. Geant4 developments and applications

By: Allison, J; Amako, K; Apostolakis, J; et al.

IEEE TRANSACTIONS ON NUCLEAR SCIENCE Volume: 53 Issue: 1 Pages: 270-278 Part: 2 Published:
FEB 2006



[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **2,177**

(from Web of Science Core Collection)

Usage Count

5. Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)

By: Ahlbom, A; Bergqvist, U; Bernhardt, JH; et al.

Group Author(s): Int Commission Nonionizing Radiation Protectio

HEALTH PHYSICS Volume: 74 Issue: 4 Pages: 494-522 Published: APR 1998

Times Cited: **2,058**

(from Web of Science Core Collection)

Usage Count

WoS 6 October 2017
Coverage:
1985-2016

Particle & Fields Physics

1. GEANT4-a simulation toolkit

By: Agostinelli, S; Allison, J; Amako, K; et al.

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS
SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 506 Issue: 3 Pages: 250-303
Published: JUL 1 2003



[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **8,422**

(from Web of Science Core Collection)

Usage Count

2. Gauge theory correlators from non-critical string theory

By: Gubser, SS; Klebanov, IR; Polyakov, AM

PHYSICS LETTERS B Volume: 428 Issue: 1-2 Pages: 105-114 Published: MAY 28 1998



[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **5,976**

(from Web of Science Core Collection)

Usage Count

3. REVIEW OF PARTICLE PHYSICS Particle Data Group

By: Beringer, J.; Arguin, J. -F.; Barnett, R. M.; et al.

Group Author(s): Particle Data Grp

PHYSICAL REVIEW D Volume: 86 Issue: 1 Article Number: 010001 Published: JUL 20 2012



[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **5,019**

(from Web of Science Core Collection)

Highly Cited Paper

Usage Count

4. The hierarchy problem and new dimensions at a millimeter

By: Arkani-Hamed, N; Dimopoulos, S; Dvali, G

PHYSICS LETTERS B Volume: 429 Issue: 3-4 Pages: 263-272 Published: JUN 18 1998



[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **4,542**

(from Web of Science Core Collection)

Usage Count

5. REVIEW OF PARTICLE PHYSICS Particle Data Group

By: Olive, K. A.; Agashe, K.; AMSler, C.; et al.

Group Author(s): Particle Data Grp

CHINESE PHYSICS C Volume: 38 Issue: 9 Article Number: 090001 Published: SEP 2014

Times Cited: **4,445**

(from Web of Science Core Collection)

Highly Cited Paper

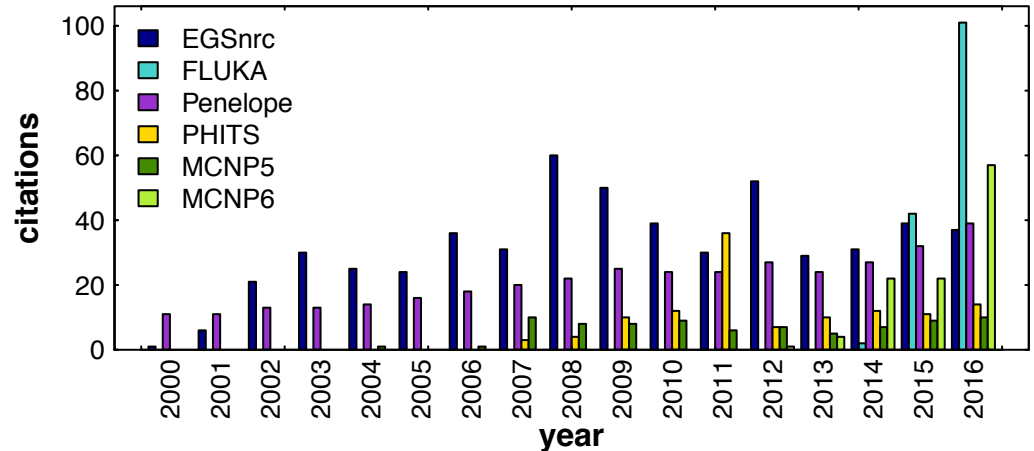
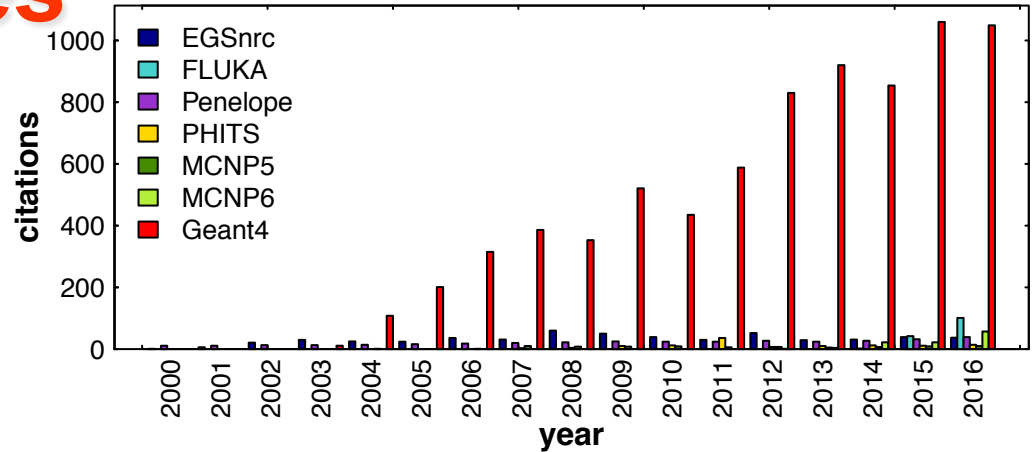
WoS 6 October 2017

Coverage:
1985-2016

Monte Carlo codes*

Code	Citations
EGSnrc	541
FLUKA	145
Geant4 NIM 2003	7631
Geant4 TNS 2006	1976
MCNP5	81
MCNP6	106
Penelope	387
PHITS	119
PHITS 2.52	158

*selection of general-purpose codes with associated publication in WoS



Monte Carlo ghosts



EGS5

- H. Hirayama et al., The EGS5 Code System, *SLAC-R-730, KEK Report 2005-8*, 2005

EGSnrc

single author!

- I. Kawrakow, Accurate condensed history Monte Carlo simulation of electron transport. I. EGSnrc, the new EGS4 version, *Med. Phys.*, 27, 485–498, 2000

FLUKA

- T. T. Böhlen et al., The FLUKA Code: Developments and Challenges for High Energy and Medical Applications, *Nucl. Data Sheets*, 120, 211-214, 2014
- A. Ferrari et al., FLUKA: a multi-particle transport code”, *CERN-2005-10 (2005), INFN/TC_05/11, SLAC-R-77, 2005*



Geant4

- 3 journal publications: NIM 2003, TNS 2006, NIM 2016



10 years!

MCNP

LA-UR-* Reports



- T. Goorley et al., Initial MCNP6 release overview, *Nucl. Technol.*, 180-3, 298-315, 2012

Penelope

- R. A. Forster, MCNP™ Version 5, *NIM B*, 213, 82-86, 2004
- J. Baró et al., PENELOPE: an algorithm for Monte Carlo simulation of the penetration and energy loss of electrons and positrons in matter, *Nucl. Instr. Meth. B*, 100, 31-46, 1995

PHITS

- K. Niita et al., PHITS—a particle and heavy ion transport code system, *Radiat. Meas.*, 41, 1080-1090, 2006
- T. Sato et al., Particle and Heavy Ion Transport code System, PHITS, version 2.52, *J. Nucl. Sci. Technol.*, 50, 913-923, 2013

>2000 registered users

(courtesy of P. Arce, CIEMAT)

GAMOS: A framework to do GEANT4 simulations in different physics fields with an user-friendly interface

By: **Arce**, Pedro; Ignacio **Lagares**, Juan; Harkness, Laura; et al.

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS
SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 735 Pages: 304-313 Published:
JAN 21 2014



7 conference papers

Times Cited: 26

(from Web of Science Core Collection)

Usage Count ▾

http://fismed.ciemat.es/GAMOS/gamos_publications.php

- P. Arce, P. Rato Mendes, J.I. Lagares, [GAMOS: a GEANT4-based Easy and Flexible Framework for Nuclear Geant4 Simulations](#), 2008 IEEE Proc. Nuc. Sci. Symp. Conf. Rec., 2008, pp. 3162 - 3168
- M. A. Cortes-Giraldo, P. Arce, J. Salguero, M. I. Gallardo, J. M. Quesada, A. Leal and R. Arrans, ["GAMOS/GEANT4 Validation in a Siemens PRIMUS Linac"](#), Proc. 2008 IEEE Nuc. Sci. Symp. Conf. Rec., 2008
- B. marechal, D. Carvalho, L. Ciuffo, I. Dutra, P. Gavillet, R. Mayo, ["Creating and Operating a Grid Infrastructure: Use Case from Latin America"](#), Proc. IST-Africa 2008, IIMC 2008
- P. Rato Mendes, P. Bruyndock, J. Navarrete, J.M. Perez, L. Zhi, ["Evaluation of Monolithic Detector Blocks for High-Sensitivity PET Imaging of the Human Brain"](#), 2007 IEEE Proc. Nuc. Sci. Symp. Conf. Rec., 2007, pp.
- P. Arce, P. Rato, J.I. Lagares, ["GAMOS status and plans"](#), 12th Collaboration Workshop and Users Conference, Hebden Bridge, United Kingdom, 13-19 September 2007
- P. Arce, P. Rato, ["GAMOS, a user-friendly and flexible framework for Geant4 medical applications"](#), 11th Collaboration Workshop and Users Conference, LIB, Lisbon, Portugal, 10-14 October 2006



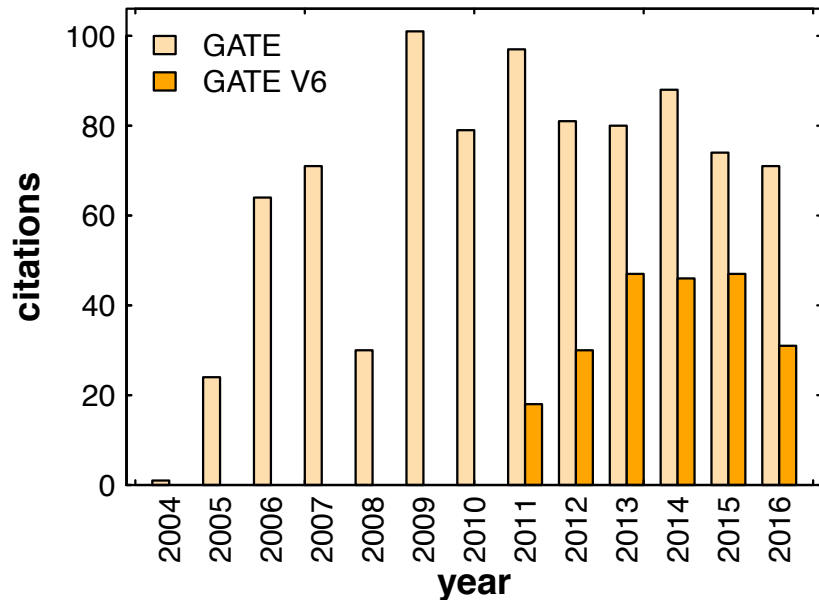
Members of the OpenGATE collaboration have won the Physics in Medicine & Biology Citations Prize twice, in 2009 for their paper 'GATE: a simulation toolkit for PET and SPECT' and in 2015 for their paper 'GATE V6: a major enhancement of the GATE simulation platform enabling modelling of CT and radiotherapy'.

929 citations

257 citations



PMB citations prize



S. Agostinelli et al.

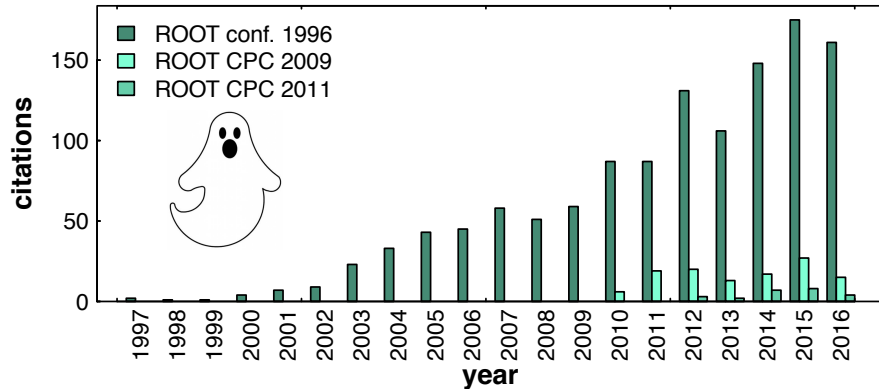
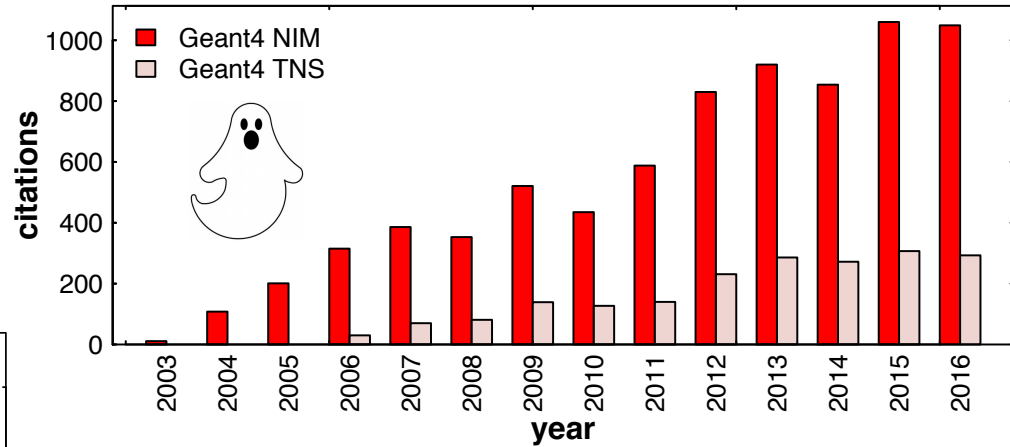
Geant4: a simulation toolkit

NIM A, vol. 506, no. 3, pp. 250-303, 2003

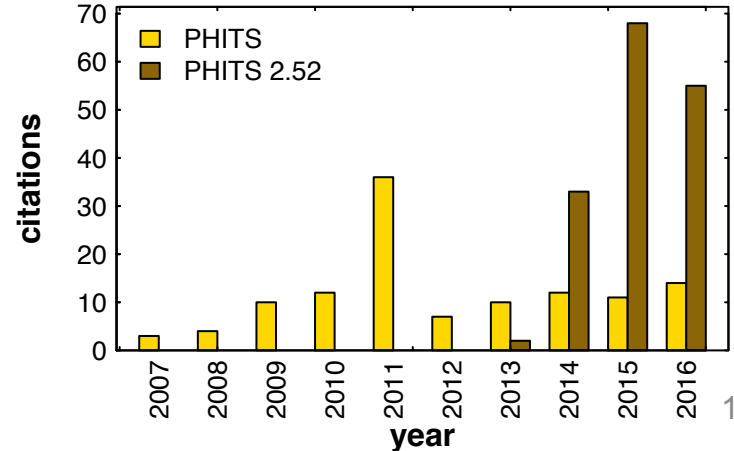
J. Allison et al.

Geant4 Developments and Applications

IEEE Trans. Nucl. Sci., vol. 53, no. 1, pp. 270-278, 2006



More recent PHITS paper is more frequently cited than the earlier reference



R. Brun and F. Rademakers

Conference proceedings

ROOT - An object oriented data analysis framework,

NIM A, vol. 389, no. 1-2, pp. 81-86, 1997

I. Antcheva et al., **ROOT - A C++ framework for petabyte data storage, statistical analysis and visualization**

Comp. Phys Comm., vol. 180, no. 12, pp. 2499-2512, 2009

1. Recent developments in GEANT4

By: Allison, J.; Amako, K.; Apostolakis, J.; et al.

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS

SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 835 Pages: 186-225 Published:
NOV 1 2016

[View Abstract](#)

2. Recent Developments in Geant4

By: Wright, D. H.

Group Author(s): Geant4 Collaboration

Edited by: Caruge, D; Calvin, C; Diop, CM; et al.

Conference: Joint 8th International Conference on Supercomputing in Nuclear Applications (SNA) / 4th Monte Carlo Meeting (MC) Location: Paris, FRANCE Date: OCT 27-31, 2013

Sponsor(s): CEA

SNA + MC 2013 - JOINT INTERNATIONAL CONFERENCE ON SUPERCOMPUTING IN NUCLEAR APPLICATIONS + MONTE CARLO Article Number: UNSP 06006 Published: 2016

[View Abstract](#)

3. Recent developments in Geant4

By: Asai, Makoto; Dotti, Andrea; Verderi, Marc; et al.

Group Author(s): GEANT4 Collaboration

Conference: Joint International Conference on Supercomputing in Nuclear Application (SNA) and Monte Carlo (MC)

Location: Paris, FRANCE Date: OCT 27-31, 2013

ANNALS OF NUCLEAR ENERGY Volume: 82 Special Issue: SI Pages: 19-28 Published: AUG 2015

[View Abstract](#)

4. Recent developments in Geant4 hadronic physics

By: Folger, Gunter

Book Group Author(s): IEEE

Group Author(s): Geant4 Hadronic Working Grp

Conference: 60th IEEE Nuclear Science Symposium (NSS) / Medical Imaging Conference (MIC) / 20th International Workshop on Room-Temperature Semiconductor X-ray and Gamma-ray Detectors Location: Seoul, SOUTH KOREA

Date: OCT 27-NOV 02, 2013

Sponsor(s): IEEE; Inst Elect & Elect Engineers, Nucl & Plasma Sci Soc

2013 IEEE NUCLEAR SCIENCE SYMPOSIUM AND MEDICAL IMAGING CONFERENCE (NSS/MIC) Published: 2013

Times Cited: 47

(from Web of Science Core Collection)

Usage Count ▾

Times Cited: 0

(from Web of Science Core Collection)

Usage Count ▾

Times Cited: 3

(from Web of Science Core Collection)

Usage Count ▾

Times Cited: 0

(from Web of Science Core Collection)

Usage Count ▾

49% authored
by Geant4
members

Status
reports?

Regional effects

Citation origin %

Code	Canada	Italy	Japan	Spain	Switzerland	USA
EGSnrc	33.3	3.3	1.5	4.6	2.8	29.6
FLUKA	4.8	33.8	7.6	6.2	26.9	26.2
Geant4 NIM	16.0	33.6	16.0	26.6	24.4	48.3
Geant4 TNS	5.5	32.3	10.0	19.6	25.7	45.4
Penelope	7.0	13.7	4.4	22.2	3.9	27.9
PHITS	3.4	10.1	57.1	5.9	12.6	24.4
PHITS 2.52	0.6	6.3	79.7	0	1.2	14.6

LHC effect in Geant4 citations: large international collaborations



Photo: Jonathan Zander

All that glitters...

Main citers:


- M. G. Pia (30)
- F. Salvat (22)
- P. Saracco, J. Sempau (17)

ND2013
The 2013 International Conference on
Nuclear Data for Science and Technology


22% citations are from
FLUKA authors

Maria Grazia Pia, INFN Genova

Nuclear Instruments and Methods in Physics Research B 100 (1995) 31–46



ELSEVIER



NIM B
Beam Interactions
with Materials & Atoms


PENELOPE: An algorithm for Monte Carlo simulation of the penetration and energy loss of electrons and positrons in matter

J. Baró^a, J. Sempau^b, J.M. Fernández-Varea^c, F. Salvat^{c,*}


^a Serveis Científic-Tècnics, Universitat de Barcelona, Martí i Franqués s/n, 08028 Barcelona, Spain
^b Institut de Tècniques Energètiques, Universitat Politècnica de Catalunya, Diagonal 647 bis, 08028 Barcelona, Spain
^c Facultat de Física (ECM), Universitat de Barcelona, Societat Catalana de Física (IEC), Diagonal 647, 08028 Barcelona, Spain

Received 30 September 1994

Available online at www.sciencedirect.com




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Nuclear Data Sheets 120 (2014) 211–214



**Nuclear Data
Sheets**

www.elsevier.com/locate/nds

The FLUKA Code: Developments and Challenges for High Energy and Medical Applications

T.T. Böhlen,¹ F. Cerutti,¹ M.P.W. Chin,¹ A. Fassò,² A. Ferrari,^{1,*}
P.G. Ortega,¹ A. Mairani,³ P.R. Sala,⁴ G. Smirnov,¹ and V. Vlachoudis¹

¹European Laboratory for Particle Physics (CERN), CH-1211 Geneva 23, Switzerland
²ELI Beamlines, Harfa Office Park Ceskomoravská 2420/15a, 190 93 Prague 9, Czech Republic
³Unità di Fisica Medica, Fondazione CNAO, I-27100 Pavia, Italy
⁴Istituto Nazionale di Fisica Nucleare, Sezione di Milano, Via Celoria 16, I-20133 Milano, Italy

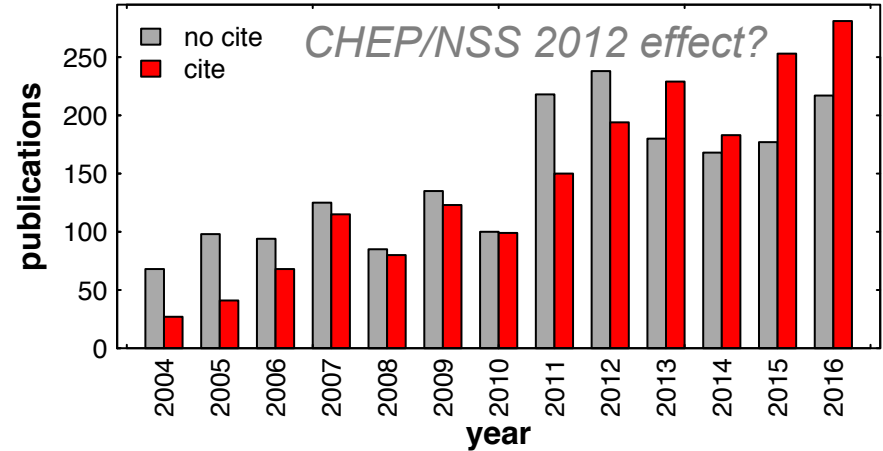
Ghostly ghosts



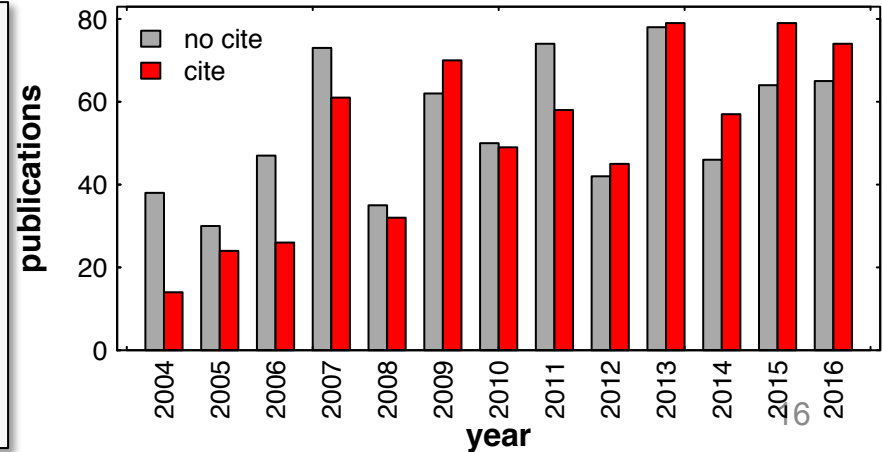
Many publications
do not cite
scientific software

systems mentioned in the text and used
to **produce the results**

Geant4 NIM 2003, Elsevier journals (Science Direct)



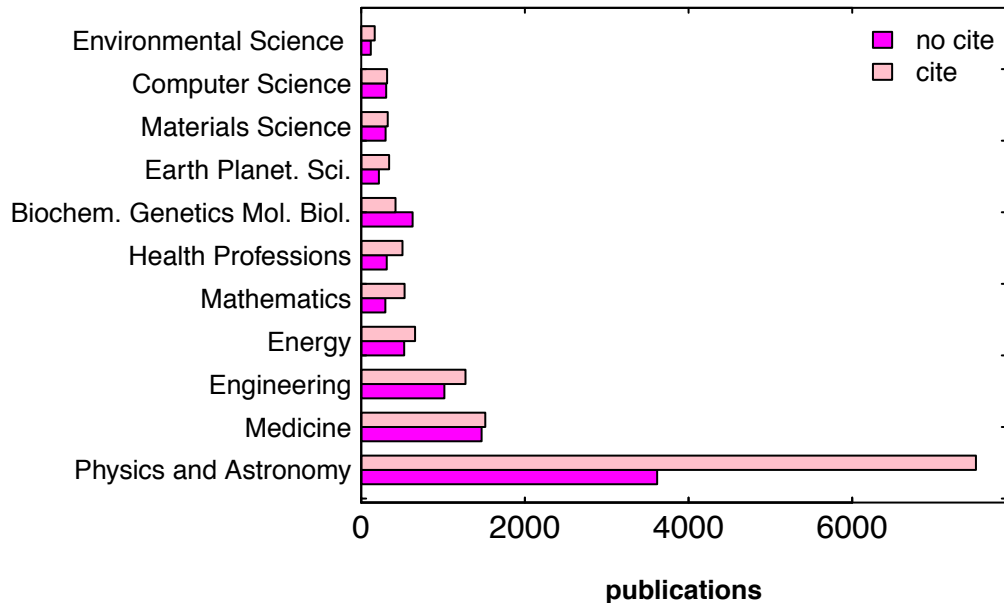
Geant4 NIM 2003, NIM A



Good guys and bad guys...

Papers omitting
Geant4 citations

Geant4 NIM 2003, subject areas



Area	Fraction
Physics and Astronomy	0.325±0.004
Medicine	0.49±0.01
Engineering	0.44±0.01
Biochem. Genetics Molec. Biol.	0.60±0.02
Energy	0.44±0.01
Health Professions	0.38±0.02
Computer Science	0.49±0.02
Materials Science	0.48±0.02
Mathematics	0.36±0.02
Earth and Planetary Sciences	0.39±0.02
Environmental Science	0.41±0.03

The fraction of papers omitting citations amounts to $\approx 1/3$ in Physics and Astronomy journals
In several applied science journals citations and omissions are roughly comparable

...and their funding agencies

- Information about the funding agencies associated with publications can be retrieved for some published papers
 - Reported only for a fraction of the papers
 - Analyzed only for the period 2015-2017 due to technical constraints
- The following results should be considered as a preliminary indication due to the small size of the data sample

Papers omitting Geant4 citations	NNSFC National Natural Science Foundation of China	23%
	DOE , U.S. Department of Energy	7%
	RFBR Russian Foundation for Basic Research	6%

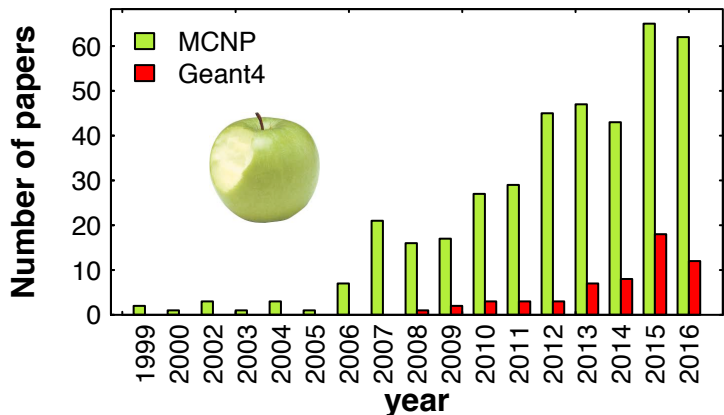
Commercial software

- Omission of citations is also observed with commercial software
- Too small statistical sample to draw conclusions regarding the extent of the omission w.r.t. scientific software

A sample of commercial software packages retrieved in TNS full text searches

	Citation	No citation
COMSOL	9	6
PSPICE	12	23

Web of Science (TS search field)



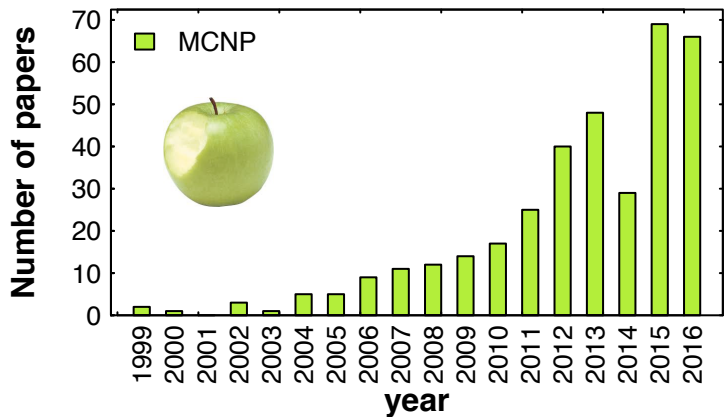
Forbidden fruit



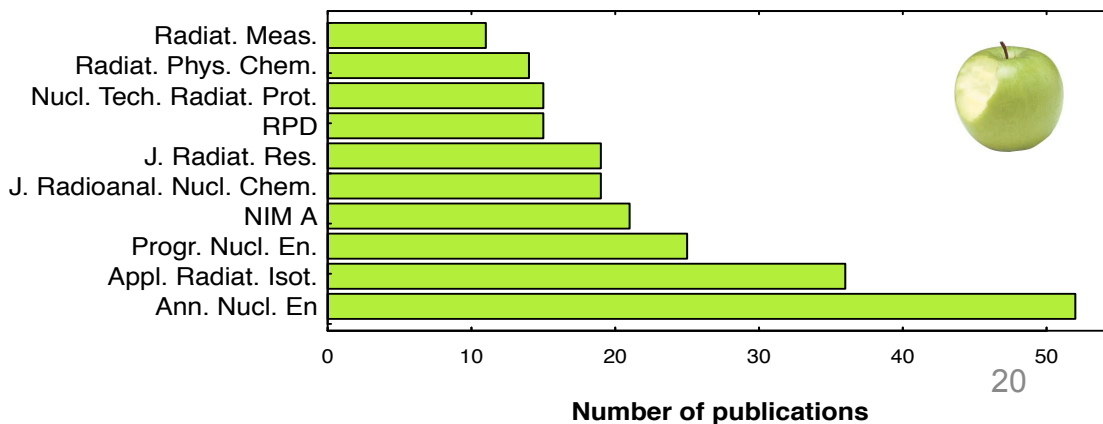
Scientific software is **hacked**
(like commercial software)

Professional ethics:
respect for the developers' work

Science Direct



Web of Science (TS search field)



Hardware vs. software at LHC

Technological research papers

Papers published in CPC, JINST, NIM A, TNS
by ALICE, ATLAS, CMS, LHCb
(excluding conference proceedings)



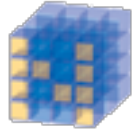
257

Papers focused on **software** topics*

~5%

~**95%** detectors/trigger or general performance/commissioning
(many use software to produce the published results)

Hardware perceived as **research**, software as a **tool**?



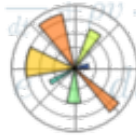
NumPy

Base N-dimensional array package



SciPy Library

Fundamental library for scientific computing



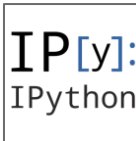
Matplotlib

Comprehensive 2D Plotting



Sympy

Symbolic mathematics



IPython

Enhanced Interactive Console



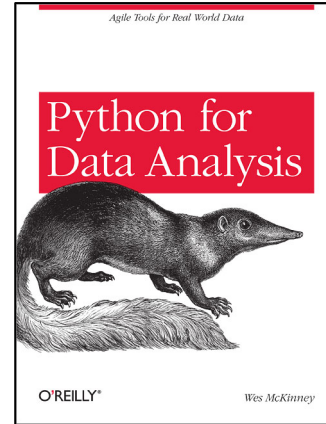
pandas

Data structures & analysis



SciKits

Ma add-on packages for SciPy



Physics
analysis
of LHC
experiments

Rapidly growing popularity in
scientific software

1. Phaser crystallographic software

By: McCoy, Airlie J.; Grosse-Kunstleve, Ralf W.; Adams, Paul D.; et al.

JOURNAL OF APPLIED CRYSTALLOGRAPHY Volume: 40 Pages: 658-674 Part: 4 Published: AUG 2007

[View Abstract](#)

Times Cited: **7,626**

(from Web of Science Core Collection)

Usage Count 

2. PHENIX: a comprehensive Python-based system for macromolecular structure solution

By: Adams, Paul D.; Afonine, Pavel V.; Bunkoczi, Gabor; et al.

ACTA CRYSTALLOGRAPHICA SECTION D-BIOLOGICAL CRYSTALLOGRAPHY Volume: 66 Pages: 213-221

Part: 2 Published: FEB 2010

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Times Cited: **7,464**

(from Web of Science Core Collection)

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3. PHENIX: building new software for automated crystallographic structure determination

By: Adams, PD; Grosse-Kunstleve, RW; Hung, LW; et al.

ACTA CRYSTALLOGRAPHICA SECTION D-BIOLOGICAL CRYSTALLOGRAPHY Volume: 58 Pages: 1948-

1954 Part: 11 Published: NOV 2002

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Times Cited: **2,635**

(from Web of Science Core Collection)

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4. Scikit-learn: Machine Learning in Python

By: Pedregosa, Fabian; Varoquaux, Gaeel; Gramfort, Alexandre; et al.

JOURNAL OF MACHINE LEARNING RESEARCH Volume: 12 Pages: 2825-2830 Published: OCT 2011

[View Abstract](#)

Times Cited: **2,497**

(from Web of Science Core Collection)

Usage Count 

5. Matplotlib: A 2D graphics environment

By: Hunter, John D.


COMPUTING IN SCIENCE & ENGINEERING Volume: 9 Issue: 3 Pages: 90-95 Published: MAY-JUN 2007

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: **1,903**

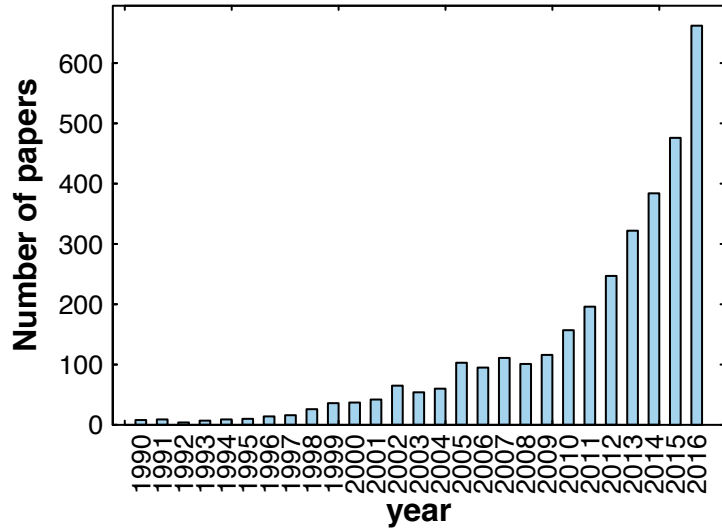
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Usage Count 

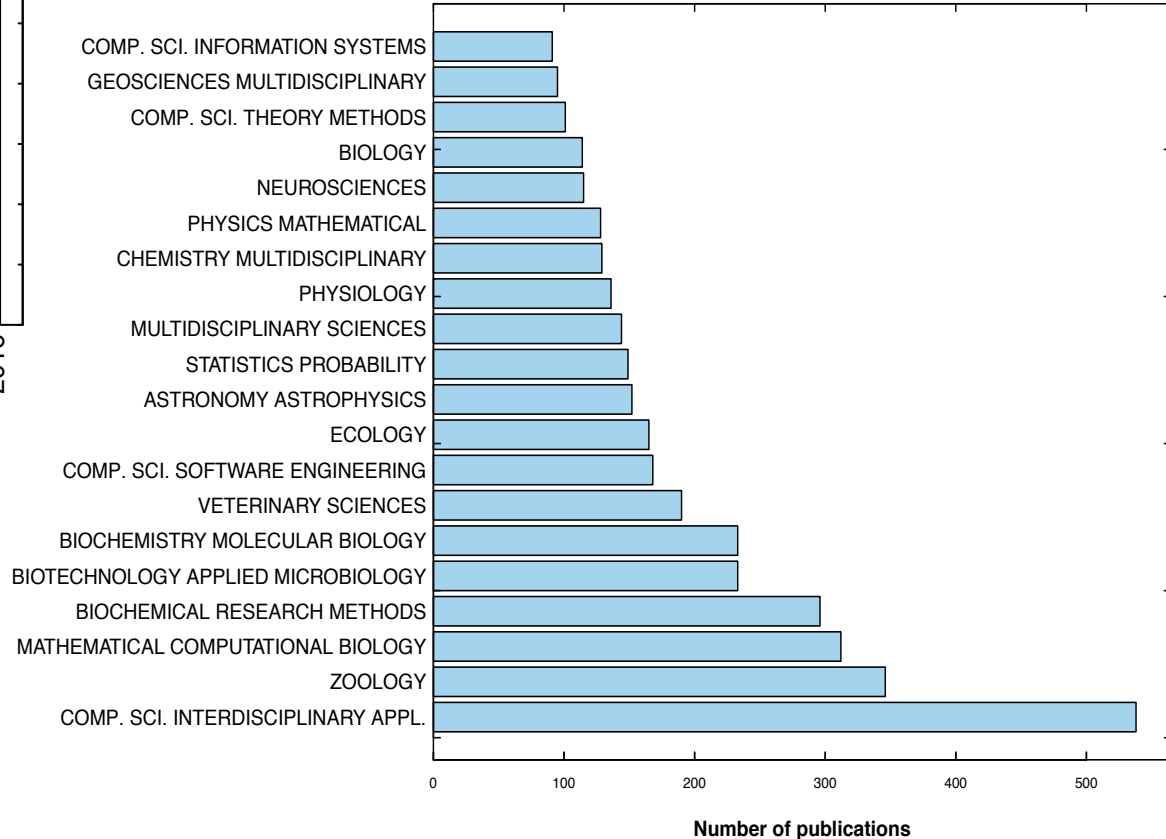


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Python in WoS



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Nucl. Sci. & Technology

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Python in HEP

~0.6% of python-related papers in WoS

Mostly
phenomenology

1. FEWZ 2.0: A code for hadronic Z production at next-to-next-to-leading order

By: Gavin, Ryan; Li, Ye; Petriello, Frank; et al.

COMPUTER PHYSICS COMMUNICATIONS Volume: 182 Issue: 11 Pages: 2388-2403 Published: NOV 2011

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: 240

(from Web of Science Core Collection)

Usage Count 

2. MADANALYSIS 5, a user-friendly framework for collider phenomenology

By: Conte, Eric; Fuks, Benjamin; Serret, Guillaume

COMPUTER PHYSICS COMMUNICATIONS Volume: 184 Issue: 1 Pages: 222-256 Published: JAN 2013

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: 135

(from Web of Science Core Collection)

Usage Count 

3. Rivet user manual

By: Buckley, Andy; Butterworth, Jonathan; Grellscheid, David; et al.

COMPUTER PHYSICS COMMUNICATIONS Volume: 184 Issue: 12 Pages: 2803-2819 Published: DEC 2013

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: 104

(from Web of Science Core Collection)

Usage Count 

4. CheckMATE: Confronting your favourite new physics model with LHC data

By: Drees, Manuel; Dreiner, Herbert K.; Kim, Jong Soo; et al.

COMPUTER PHYSICS COMMUNICATIONS Volume: 187 Pages: 227-265 Published: FEB 2015

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: 77

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Usage Count 

5. W physics at the LHC with FEWZ 2.1

By: Quackenbush, Seth; Gavin, Ryan; Li, Ye; et al.

COMPUTER PHYSICS COMMUNICATIONS Volume: 184 Issue: 1 Pages: 209-214 Published: JAN 2013

Times Cited: 70

(from Web of Science Core Collection)



Python in TNS, NIM A/B, JINST

Underrepresented
in the literature
w.r.t. widespread
use in experimental
research in our field



1. Physical Processes and Applications of the Monte Carlo Radiative Energy Deposition (MRED) Code

By: Reed, Robert A.; Weller, Robert A.; Mendenhall, Marcus H.; et al.

IEEE TRANSACTIONS ON NUCLEAR SCIENCE Volume: 62 Issue: 4 Pages: 1441-1461 Part: 1 Published: AUG 2015

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: 9

(from Web of Science Core Collection)

Usage Count

2. KEKB accelerator control system

By: Akasaka, N; Akiyama, A; Araki, S; et al.

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 499 Issue: 1 Pages: 138-+ Article Number: PII S0168-9002(02)01786-2 Published: FEB 21 2003

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Times Cited: 9

(from Web of Science Core Collection)

Usage Count

3. The LCG PI project: Using interfaces for physics data analysis

By: Pfeiffer, A; Moneta, L; Innocente, V; et al.

IEEE TRANSACTIONS ON NUCLEAR SCIENCE Volume: 52 Issue: 6 Pages: 2823-2826 Part: 2 Published: DEC 2005

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: 6

(from Web of Science Core Collection)

Usage Count

4. New EPICS Channel Archiver Based on MDSplus Data System

By: Manduchi, G.; Luchetta, A.; Taliervo, C.; et al.

IEEE TRANSACTIONS ON NUCLEAR SCIENCE Volume: 58 Issue: 6 Pages: 3158-3161 Part: 2 Published: DEC 2011

[Full Text from Publisher](#)

[View Abstract](#)

Times Cited: 4

(from Web of Science Core Collection)

Usage Count

5. RAVE-A Detector-Independent Toolkit to Reconstruct Vertices

By: Waltenberger, Wolfgang

IEEE TRANSACTIONS ON NUCLEAR SCIENCE Volume: 58 Issue: 2 Pages: 434-444 Published: APR 2011

Times Cited: 4

(from Web of Science Core Collection)

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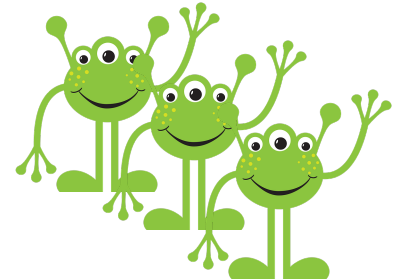
Detector development is not a pertinent subject for a nuclear instrumentation journal

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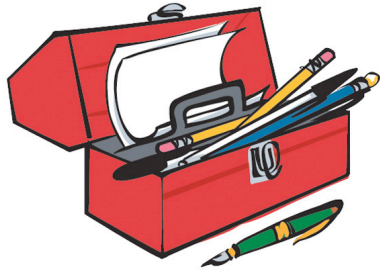
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detector ↔ **software**



Conclusions



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