INSPIRE

Revitalizing Information Infrastructure for the HEP Community

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SLAC
Manager of Information Systems & SPIRES

HEPAP
May 22, 2009

SLAC NATIONAL ACCELERATOR LABORATORY

INSPIRE alpha

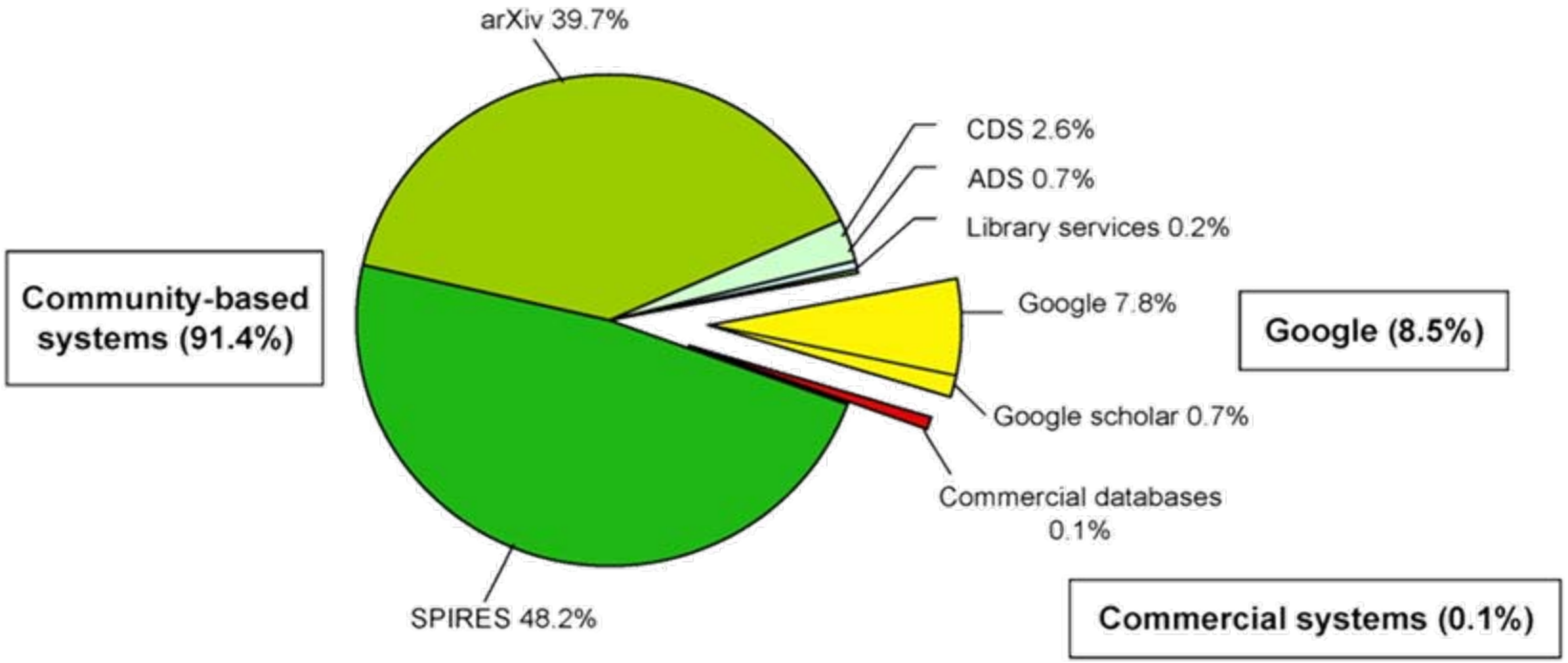
Overview

- Current HEP Information Landscape
  - From the SPIRES perspective
- Future of HEP Information Systems
  - INSPIRE Project Inception
- INSPIRE Service
  - Features, Status and Opportunities

Current Information Landscape

- SPIRES (SLAC, Fermilab, DESY)
- arXiv.org (Cornell U., NSF)
- PDG (LBNL, DOE+NSF+CERN+…)
- CDS (CERN)
- Publishers (APS, Elsevier, JHEP, Springer,…)
- Other Resources
  - HEPDATA (Durham)
  - Google/Google Scholar
  - NASA-ADS

Where Do Physicists Search?



From 2007 survey of 2,000 physicists by CERN, DESY, Fermilab and SLAC.
Gentil-Beccot et al, *Information Resources in High-Energy Physics: Surveying the Present Landscape and Charting the Future Course*. J.Am.Soc.Inf.Sci.60:150-160,2009 arXiv:0804.2701

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Press Release.
Published in **Phys.Rev.Lett.97:242003,2006**.
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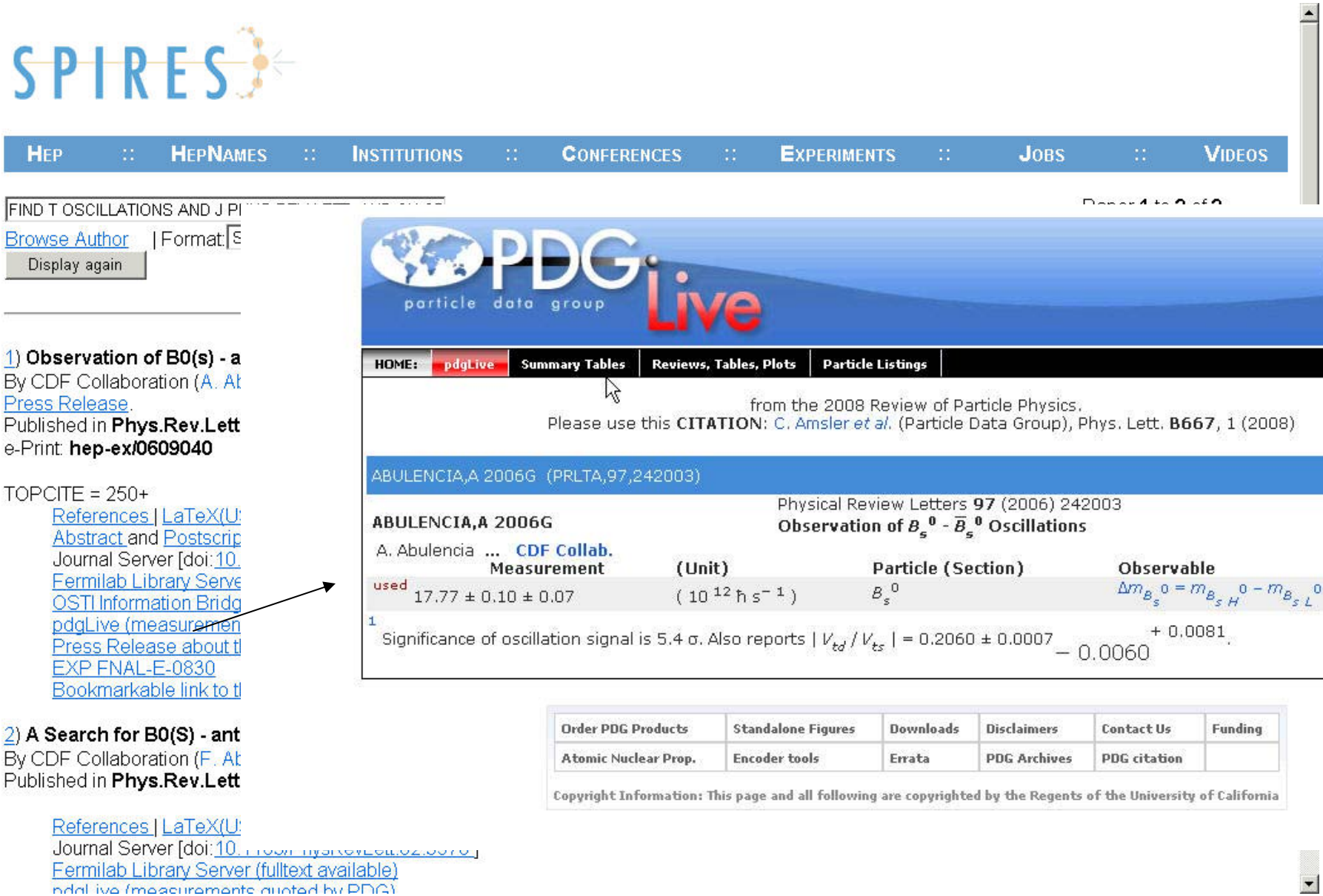
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Physical Review Letters 97 (2006) 242003
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Observation of B_s^0 - $\bar{B}_s^0$ Oscillations
A. Abulencia ... CDF Collab.
Measurement (Unit) Particle (Section) Observable
used 17.77 ± 0.10 ± 0.07 (10^{12} ħ s^{-1}) B_s^0 $\Delta m_{B_s^0} = m_{B_{sH}^0} - m_{B_{sL}^0}$
1 Significance of oscillation signal is 5.4 σ. Also reports | V_{td} / V_{ts} | = 0.2060 ± 0.0081 − 0.0060.
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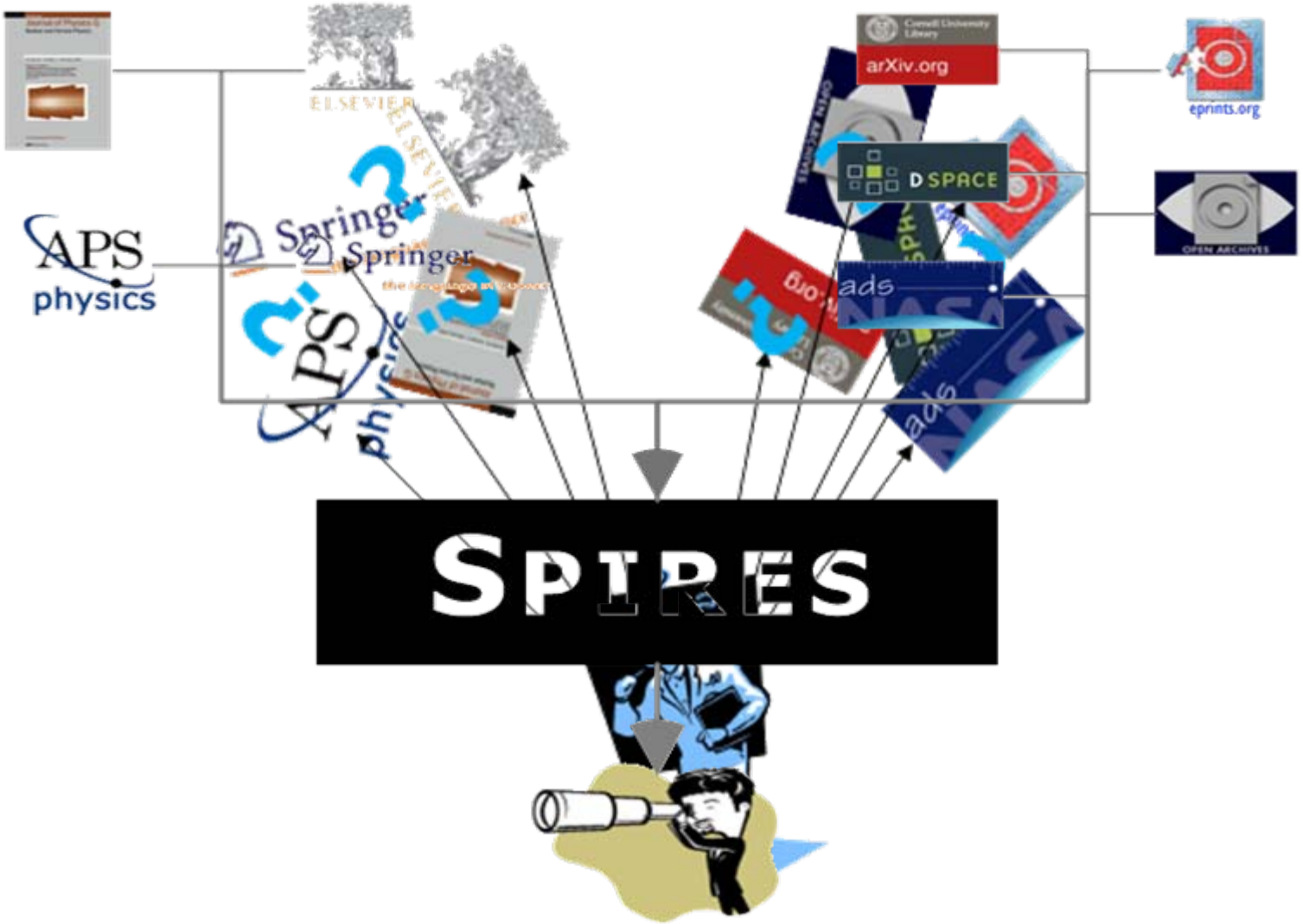
For immediate release

IT MIGHT BE...IT COULD BE...IT IS!!!

Fermilab's CDF scientists make it official: They have discovered the quick-change behavior of the B-sub-s meson, which switches between matter and antimatter 3 trillion times a second.

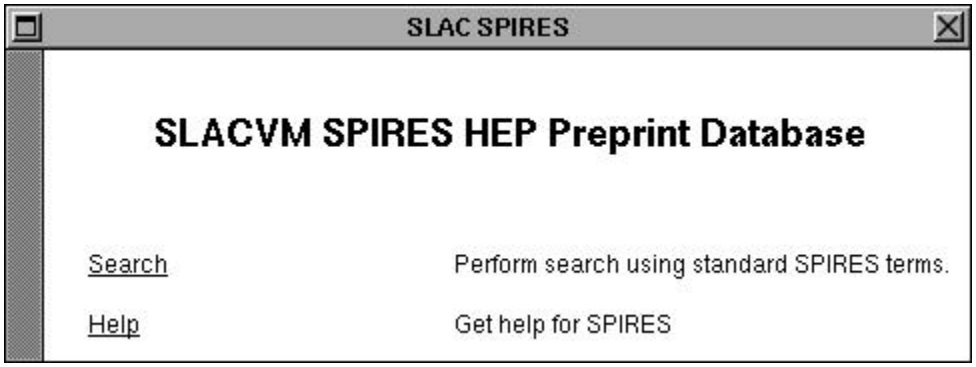
BATAVIA, Illinois - Scientists of the CDF collaboration at the Department of Energy's Fermi National Accelerator Laboratory announced today (September 25, 2006) that they have met the exacting standard to claim discovery of astonishingly rapid transitions between matter and antimatter: 3 trillion oscillations per second.

SPIRES Organizes HEP



SPIRES' History

- Collaboration of DESY, Fermilab and SLAC
- Community driven and defined
- Currently 1-1.5 Million queries/month
- Index to HEP literature for 35 years
  - Via terminal login
  - Via email
  - Via web (1st U.S. Website/1st web database)
- SPIRES' software infrastructure dates from the 70's



SPIRES' Features

- Citation linking/counting
- Author and affiliation searching
- User contributions and corrections
- Additional community information
  - Jobs
    - 50K searches/month
    - 1300 Jobs listed from over 400 institutions (in 2008)
  - Names
    - 20K PhD affiliations
    - 15K User-verified entries
    - 1300 with full institutional history
  - Conferences, Institutions, Experiments

Future of HEP Information

- HEP becoming more interdisciplinary
  - Particle astrophysics
- Literature growing more complex
  - Computer code
  - Objects that aren't papers, but are "information"
    - "Datasets", figures, tables
- Recent advances in information systems
  - Modern coding and design
  - Mashups
  - Web 2.0

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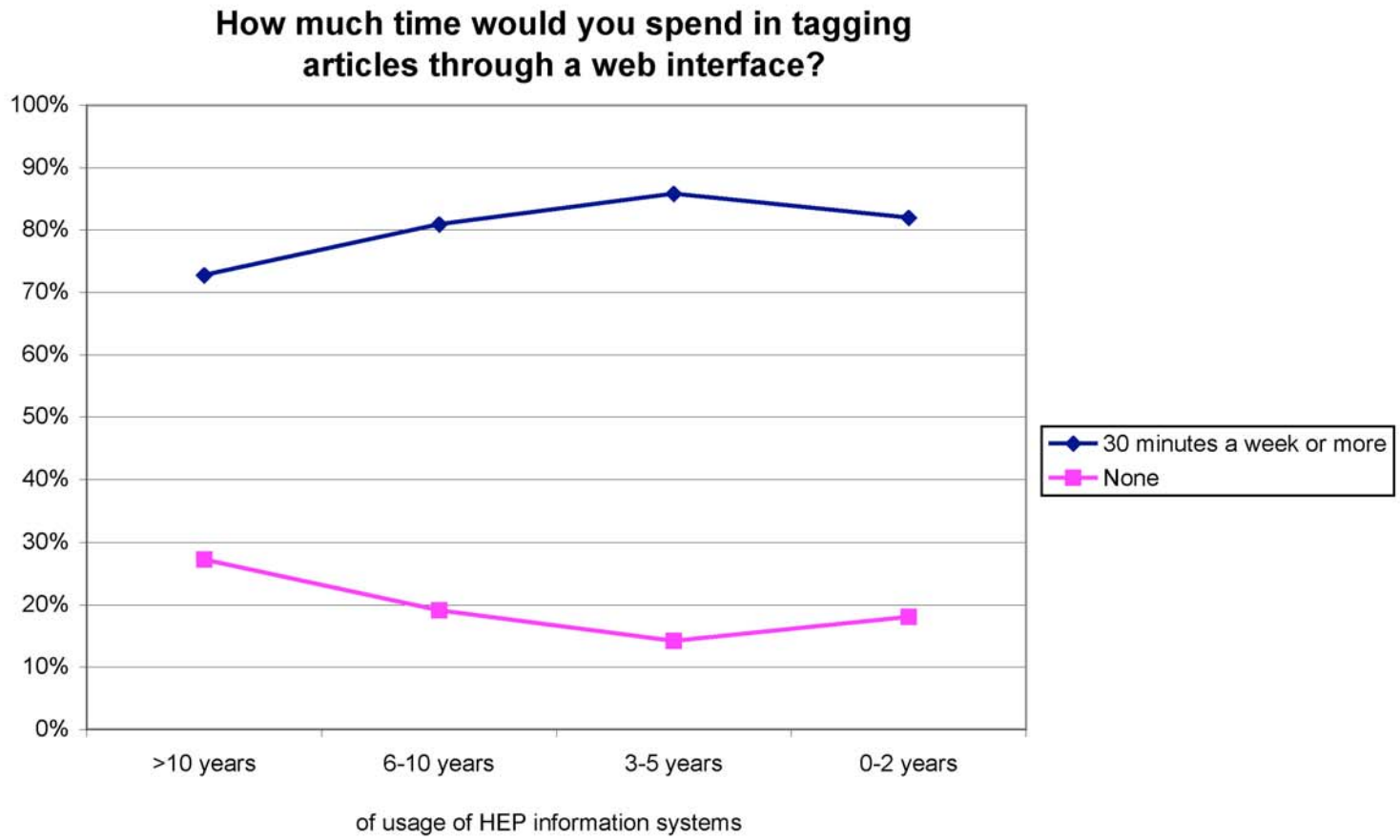

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Gentil-Beccot et al, *Information Resources in High-Energy Physics: Surveying the Present Landscape and Charting the Future Course*. J.Am.Soc.Inf.Sci.60:150-160,2009 arXiv:0804.2701

SPIRES' Future?

- SPIRES should grow with the field and with technology
- SPIRES' 35 year old infrastructure cannot take advantage of new tools
  - Needs a solid foundation on which to build
  - 3-4 Years ago SPIRES began looking for migration possibilities

Build New Systems…

- Build from scratch?
  - Expensive
  - Unlikely to integrate well
- Adapt an existing system?
  - Citeseer: too specialized to CS
  - NASA-ADS: similar (old) codebase
  - DSpace/Fedora/eprints: too far from existing features
  - Google Scholar: not specialized to HEP

..Or Build New Partnerships

- May 2007 at SLAC: 1st Annual PPA Information Resource Summit
  - APS, Elsevier, Springer, JHEP, Google, arXiv, PDG, NASA-ADS, SLAC, Fermilab, DESY and CERN
  - INSPIRE project emerges from discussions
    - CERN, DESY, Fermilab and SLAC join to provide new HEP information system
  - INSPIRE = Invenio + SPIRES
    - Existing CERN Invenio software provides software foundation
    - Existing SPIRES content and feature set provides the initial target system

Invenio: Modern System…

- Stable, modern, extensible software stack (LAMP)
- Variety of search and display options
- Fast
- Well-defined API for “mashups” etc.
- Open Source community
  - Substantial HEP use (CERN, ILC, …)
  - Over 100 Installations worldwide
  - Development and design expertise at CERN

…Complementing SPIRES' Strengths

- Decades of trusted, curated content
- Experience managing a discipline wide information resource
- Close relationship with worldwide user community
- Operational resources at DESY, Fermilab and SLAC
  - Will move forward to INSPIRE

INSPIRE Project Timeline

- Summer 2007
  - Initial project concept and planning
- Fall 2007/Winter 2008
  - Initial testing and data mapping
- Spring 2008
  - Expression of Interest by research directors at CERN, DESY, Fermilab and SLAC
  - Alpha version of end-user interface complete
- Summer/Fall 2008
  - Refinement of User Interface
  - Construction of tools for INSPIRE staff to maintain and enrich the database
- Winter 2009
  - Maintenance tools progress
  - Automated Content Classification and Keywording
- Spring/Summer 2009 (To Do)
  - Finalize Tools and Interface
  - Workflow tracking system
  - Improvement of user corrections interface
  - Stress testing
- Fall/Winter 2009 (To Do)
  - Release of INSPIRE for users.
  - Development and deployment of new features enabled by new technology

INSPIRE as a Service

- Will be run by CERN, DESY, Fermilab and SLAC as a collaborative service
- Will partner with HEP publishers, arXiv, PDG, NASA-ADS and other information resources
- Will work closely with the HEP community


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1. **Cosmological Constant and Axions in String Theory.**
Peter Svrcek (Stanford U., Phys. Dept. & SLAC). SLAC-PUB-11957. Jul 13, 2006. 22 pp.
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Published in **JHEP 0606: 051, 2006**
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Axions In String Theory.

Peter Svrcek (Stanford U., Phys. Dept. & SLAC), Edward Witten (Princeton, Inst. Advanced Study).
May 22, 2006

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Abstract: In the context of string theory, axions appear to provide the most plausible solution of the strong CP problem. However, as has been known for a long time, in many string-based models, the axion coupling parameter F_a is several orders of magnitude higher than the standard cosmological bounds. We re-examine this problem in a variety of models, showing that F_a is close to the GUT scale or above in many models that have GUT-like phenomenology, as well as some that do not. On the other hand, in some models with Standard Model gauge fields supported on vanishing cycles, it is possible for F_a to be well below the GUT scale.

Keyword(s): string model: heterotic ; gauge field theory: SU(3) ; instanton ; axion ; violation: CP ; dimensional reduction ; anomaly ; membrane model: D-brane ; bibliography

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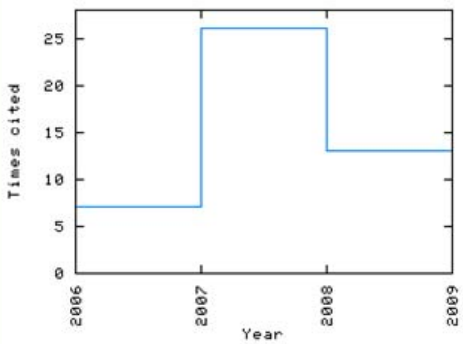

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  - Cataloging/User service staff will be more efficient
- Need enhanced ongoing computing resources
  - Support infrastructure and prevent decay
  - Development will become globally distributed as system becomes operational
  - Enable the service to grow with the field's needs

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- Claim your papers
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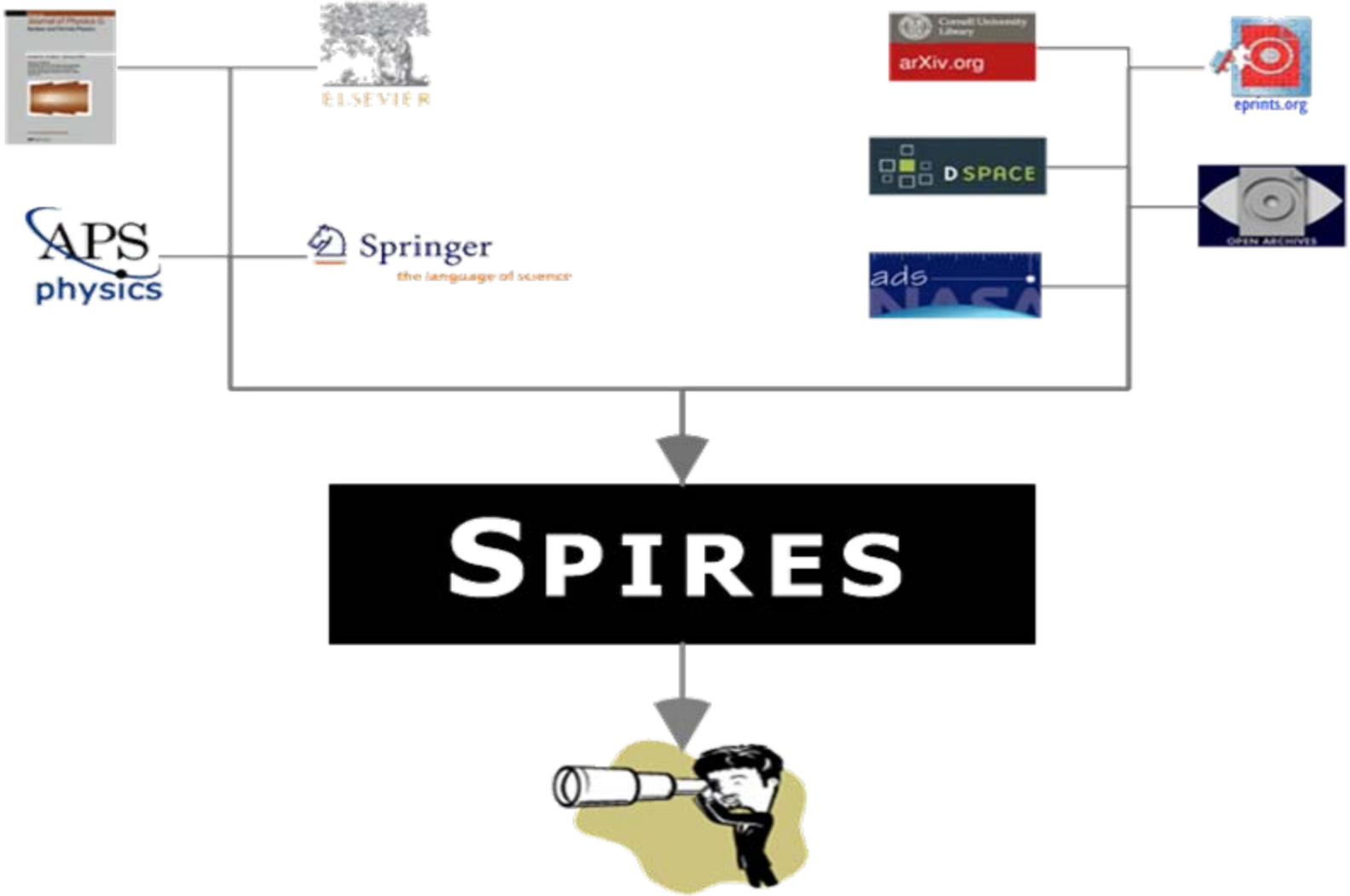

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