ADS Update

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NASA Astrophysics Data System
Harvard-Smithsonian Center for Astrophysics

21 September 2011
AAHEP 5
Overview

• ADS in transition: new IT platform, new interface, new collaborations
• Fulltext archive and search service
• Future developments
• Data Publishing/Linking
• VAO Data Curation & Preservation efforts
The ADS in transition

• Move system to a Open Source, modern architecture
• Provide support for richer metadata
• Industrial strength indexing, searching
• New rankings, search modes
• Improved interoperability, metadata fusion
• New user interface, additional functionality
Technology

• Metadata curation and management: Invenio
  ▶ Developed by CERN, adopted by INSPIRE and soon arXiv
  ▶ Bibliographic data ingest, merging, citation linking, user accounts

• Indexing and searching: SOLR/Lucene
  ▶ Enterprise search platform developed by Apache Foundation
  ▶ Indexing, searching, filtering, relevancy ranking

• Data Linking, faceting: Sesame/SOLR
  ▶ Semantic metadata store captures links to and properties of data products, astronomical objects
Introducing ADS Labs

• Streamlined search with different query “modes” and rankings
• Faceted filtering, integration of external observational metadata
• Visualization of paper, author networks, sky map for related celestial objects
• Personalizations and recommendations
• Fulltext search, and “look inside the paper”

http://adslabs.org
author:"kurtz,m.j."
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<td>1</td>
<td>1998</td>
<td>RVSAO 2.0: Digital Redshifts and Radial Velocities</td>
<td>Kurtz, Michael J.; Mink, Douglas J.</td>
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<td>2</td>
<td>1992</td>
<td>XCSAO: A Radial Velocity Package for the IRAF Environment</td>
<td>Kurtz, Michael J.; Mink, Douglas J.; Wyatt, William F.; Fabricant, Daniel G.; Torres, Guillerio; Kriss, Gerard A.; Tony, John L.</td>
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<td>3</td>
<td>2000</td>
<td>The NASA Astrophysics Data System: Overview</td>
<td>Kurtz, Michael J.; Eichorn, Guenther; Accomazzi, Alberto; Grant, Carolyn S.; Murray, Stephen S.; Watson, Joyce M.</td>
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<td></td>
<td></td>
<td>Astronomy and Astrophysics Supplement, v.143, p.41-59 Apr 2000</td>
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<td>4</td>
<td>2007</td>
<td>μ-PhotoZ: Photometric Redshifts by Inverting the Tolman Surface Brightness Test</td>
<td>Kurtz, Michael J.; Geller, Margaret J.; Fabricant, Daniel G.; Wyatt, William F.; Dell'Antonio, Ian P.</td>
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<td>7</td>
<td>2005</td>
<td>The Effect of Use and Access on Citations</td>
<td>Kurtz, Michael J.; Eichorn, Guenther; Accomazzi, Alberto; Grant, Carolyn; Demleitner, Markus; Henneken, Edwin; Murray, Stephen S.</td>
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<td>8</td>
<td>1993</td>
<td>Intelligent Text Retrieval in the NASA Astrophysics Data System</td>
<td>Kurtz, Michael J.; Murray, Stephen S.; Dell'Antonio, Ian P.</td>
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</table>
weak gravitational lensing - Most popular

NO FILTERS APPLIED

1. 1998AJ....116.1009R Observational Evidence from Supernovae for an Accelerating Universe and a Cosmological Constant
   Riess, Adam G.; Filippenko, Alexei V.; Challis, Peter; Clocchiatti, Alejandro; Diercks, Alan; Garnavich, Peter M.; Gilliland, Ron L.; Hogan, Craig J.; Jha, Saurabh; Kirshner, Robert P.; and 10 coauthors
   Matches in Abstract / Matches in fulltext

   Clowe, Douglas; Bradač, Maruša; Gonzalez, Anthony H.; Markevitch, Maxim; Randall, Scott W.; Jones, Christine; Zaritsky, Dennis
   Matches in Abstract / Matches in fulltext
   Matches in fulltext
   - ... using weak gravitational lensing (Mellier 1999; Bartelmann Schneider 2001), which measures the distortions ...
   - ... of the weak-lensing results by more than a factor of 3. In this Letter, we measure distances at the redshift ...
   - ... panel: 500 ks Chandra image of the cluster. Shown in green contours in both panels are the weak-lensing k ...
   - ... independent of any gravity or dark matter models. 4. DISCUSSION A key limitation of the gravitational lensing ...
   - ... to have cooled into stars) extending from the cluster at the locations of the weak-lensing peaks. To explain ...
   - ... While such projections become more important in nonstandard gravity models because the thin lens approximation breaks ...
   - ... possibility is that some alternative gravity models may be able to suppress the lensing potential ...
   - ... 1. INTRODUCTION We have known since 1937 that the gravitational potentials of galaxy clusters ...
   - ... dominant quantities of nonluminous “dark matter” (Oort 1932) or alterations to either the gravitational ...
   - ... 1983). Previous works aimed at distinguishing between the dark matter and alternative gravity hypotheses ...

3. 2011arXiv1102.1183G Why the dark matter of galaxies is clumps of micro-brown-dwarfs and not Cold Dark Matter
   Gibson, Carl H.
   eprint arXiv:1102.1183 Feb 2011
   Matches in Abstract / Matches in preprint
weak gravitational lensing - Most popular

   Clowe, Douglas; Bradač, Maruša; Gonzalez, Anthony H.; Markevitch, Maxim; Randall, Scott W.; Jones, Christine; Zaritsky, Dennis
   Matches in Abstract / Matches in fulltext

27. **2010A&A...516A..63S** Evidence of the accelerated expansion of the Universe from weak lensing tomography with COSMOS
   *Astronomy and Astrophysics, Volume 516, id.A63*. Jun 2010
   Matches in Abstract / Matches in fulltext

36. **2007MNRAS.382...29B** The Bullet Cluster 1E0657-558 evidence shows modified gravity in the absence of dark matter
   Brownstein, J. R.; Moffat, J. W.
   Matches in Abstract / Matches in fulltext

   Coe, Dan; Benítez, Narciso; Broadhurst, Tom; Moustakas, Leonidas A.
   Matches in Abstract / Matches in fulltext

   Bradač, Maruša; Clowe, Douglas; Gonzalez, Anthony H.; Marshall, Phil; Forman, William; Jones, Christine; Markevitch, Maxim; Randall, Scott; Schrabback, Tim; Zaritsky, Dennis
   Matches in Abstract / Matches in fulltext

   Leauthaud, Alexie; Finoguenov, Alexis; Kneib, Jean-Paul; Taylor, James E.; Massey, Richard; Rhodes, Jason; Ilbert, Olivier; Bundy, Kevin; Tinker, Jeremy; George, Matthew R.; and 20 coauthors
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<th>Rank</th>
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<th>Abstract</th>
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| 58.  | 2010ApJ...723.1678C A High-resolution Mass Map of Galaxy Cluster Substructure: LensPerfect Analysis of A1689 | Coe, Dan; Benítez, Narciso; Broadhurst, Tom; Moustakas, Leonidas A.  
Matches in Abstract / Matches in fulltext |
| 61.  | 2006ApJ...652..937B Strong and Weak Lensing United. III. Measuring the Mass Distribution of the Merging Galaxy Cluster 1ES 0657-558 | Bradač, Maruša; Clowe, Douglas; Gonzalez, Anthony H.; Marshall, Phil; Forman, William; Jones, Christine; Markevitch, Maxim; Randall, Scott; Schrabback, Tim; Zaritsky, Dennis  
Matches in Abstract / Matches in fulltext |
| 67.  | 2010ApJ...709...97L A Weak Lensing Study of X-ray Groups in the Cosmos Survey: Form and Evolution of the Mass-Luminosity Relation | Leauthaud, Alexie; Finoguenov, Alexis; Kneib, Jean-Paul; Taylor, James E.; Massey, Richard; Rhodes, Jason; Ilbert, Olivier; Bundy, Kevin; Tinker, Jeremy; George, Matthew R.; and 20 coauthors  
Matches in Abstract / Matches in fulltext |
| 78.  | 2010MNRAS.405..257M Detailed cluster mass and light profiles of A1703, A370 and RXJ1347-11 from deep Subaru imaging | Medezinski, Elinor; Broadhurst, Tom; Umetsu, Keiichi; Oguri, Masamune; Rephaeli, Yoel; Benítez, Narciso  
Matches in Abstract / Matches in fulltext |
| 103. | 2010ApJ...714...423K Suzuky Observation of A1689: Anisotropic Temperature and Entropy Distributions Associated with the Large-scale Structure | Kawaharada, Madoka; Okabe, Nobuhiro; Umetsu, Keiichi; Takizawa, Motokazu; Matsushita, Kyoko; Fukazawa, Yasushi; Hamana, Takashi; Miyazaki, Satoshi; Nakazawa, Kazuhiro; Ohashi, Takaya  
Matches in Abstract / Matches in fulltext |
A High-resolution Mass Map of Galaxy Cluster Substructure: LensPerfect Analysis of A1689

Coe, Dan; Benitez, Narciso; Broadhurst, Tom; Moustakas, Leonidas A.


Published in Nov 2010

We present a strong lensing (SL) mass model of A1689 which resolves substructures an estimated 25 kpc across within the central ~400 kpc diameter. We achieve this resolution by perfectly reproducing the observed (strongly lensed) input positions of 168 multiple images of 55 knots residing within 135 images of 42 galaxies. Our model makes no assumptions about light tracing mass, yet we reproduce the brightest visible structures with some slight deviations. A1689 remains one of the strongest known lenses on the sky, with an Einstein radius of $RE = 47\text{arcsec} \pm 1\text{arcsec}2$ (143+3 -4 kpc) for a lensed source at $z_s = 2$.  We find that a single Navarro-Frenk-White (NFW) or Sérsic profile yields a good fit simultaneously with only slight tension to both our SL mass model and published weak lensing (WL) measurements at larger radius (to the virial radius). According to this NFW fit, A1689 has a mass of $M_{\text{vir}} = 2.0+0.5 -0.3 \times 10^{15} \text{M}_\odot$ within $r_{\text{vir}} = 3.0 \pm 0.2 \text{Mpc}$ and $r_{\text{vir}} = 7.0$ ($r_{\text{vir}} = 2.4+0.1 -0.2 \text{Mpc}$ within $r_{\text{vir}} = 7.0$) and a central concentration $c_{\text{vir}} = 11.5+1.5 -1.4$ ($c_{\text{vir}} = 9.2 \pm 1.2$). Our SL model prefers slightly higher concentrations than previous SL models, bringing our SL + WL constraints in line with other recent derivations. Our results support those of previous studies which find A1689 has either an anomalously large concentration or significant extra mass along the line of sight (perhaps in part due to triaxiality). If clusters are generally found to have higher concentrations than realized in simulations, this could indicate that they formed earlier, perhaps as a result of early dark energy.

Keywords:

DOI: 10.1088/0004-637X/723/2/1678

Future developments

- Transition from ADS Labs to “ADS 2.0”
  - Complete transition to new IT platform (2012/2013)
  - Wean people off old system by providing new functionality, features in new one

- Future efforts
  - Text mining for metadata enrichment, improved services
  - Enhanced links to data products, annotations
  - Better support for metrics, personal and project pages
  - Support distributed/collaborative curation
Full-text Use Cases

• Support full-text search, data mining
  • Most requested feature from librarians, archivists
  • Born-digital content has structure, markup, links

• Full-text is not only the end but the means
  • ADS metadata enrichment (keywords, abstracts, citations)
  • Extraction of acknowledgements, funding sources
  • Search enhancements (look inside paper)
  • Support annotations ("this paper uses the Chandra catalog for source selection and Spitzer imaging")
  • Support semantics (link keywords, objects, facilities, grant numbers, etc. to appropriate knowledge bases)
Support for Metrics

- ADS already used to evaluate papers, people, projects
  - Citations, readership used to rank papers
  - Refereed publications, citations, h-index used to evaluate people, institutions, projects
  - Problems exist with author disambiguation, normalizations

- Provide support for better statistics, interfaces
  - Author ID, paper claiming will reduce ambiguity
  - Affiliation normalization will aid institutional metrics
  - “Author” or “Project” summary pages possible
**VAO AstroExplorer**

- **Research Portfolio App to browse Resources, Concepts**
  - Connect Publications, Objects, Datasets, Proposals
  - Focus on Pointed Observations from missions, archives
  - Incorporate bibliographic, object metadata

- **Science Functions: Explore, Search, Filter, Save**
  - Provide views of Publications, Datasets, Objects, Proposals
  - Complement Portal: do not replicate positional search
  - Promote data reuse, research repeatability

- **Generate Metrics**
  - App will additionally be useful for librarians, program managers, funders, etc, as linkages can be used to evaluate impact

- **LESS IS MORE:** Keep signal to noise high, stress curation

[http://adslabs.org/semantic](http://adslabs.org/semantic)
FUSE Observation of the Narrow-Line Seyfert 1 Galaxy RE 1034+39: Dependence of Broad Emission Line Strengths on the Shape of the Photoionizing Spectrum (Link) [P]

**Authors:** Baron, E ; Casebeer, D ; Leighly, K

**Year:** 2006  **BibCode:** 2006ApJ...637..157C  **Citations:** 86

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**Abstract:** We present an analysis from simultaneous FUSE, ASCA, and EUVE observations, as well as a reanalysis of archival HST spectra, from the extreme narrow-line Seyfert 1 Galaxy RE 1034+39 (KUG 1031+398). RE 1034+39 has an unusually hard spectral energy distribution (SED) that peaks in the soft X-rays. Its emission lines are unusual in that they can all be modeled as a Lorentzian centered at the rest wavelength with only a small range in velocity widths. In order to investigate whether the unusual SED influences the emission-line ratios and equivalent widths, we present three complementary