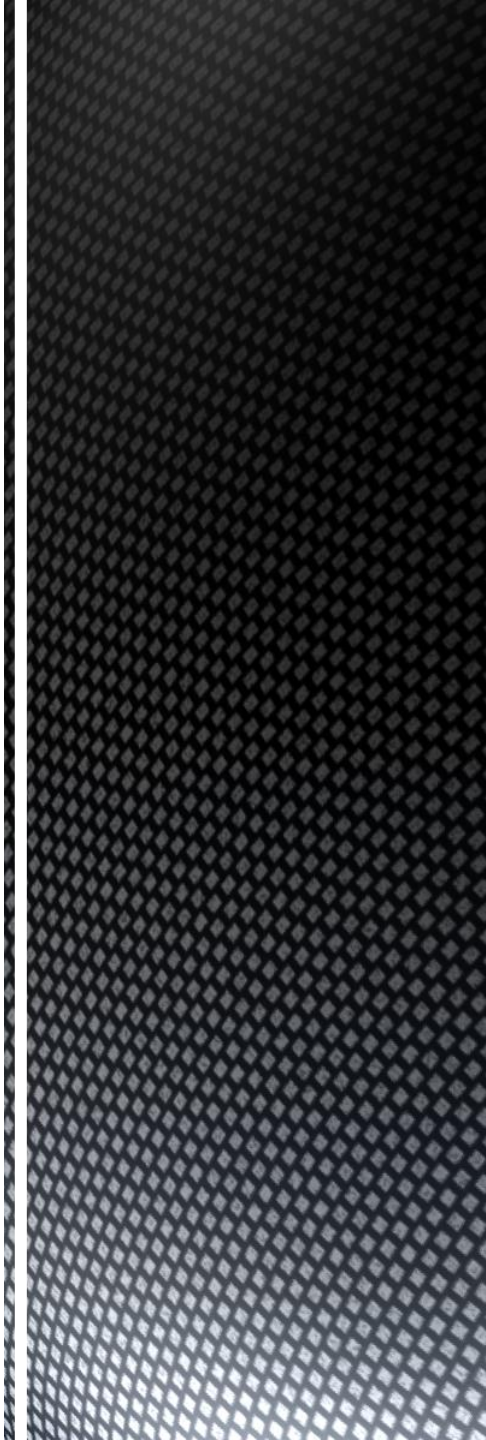
arXiv.org as a repository of record: opportunities and challenges

David Ruddy
Cornell University Library
21 April 2015



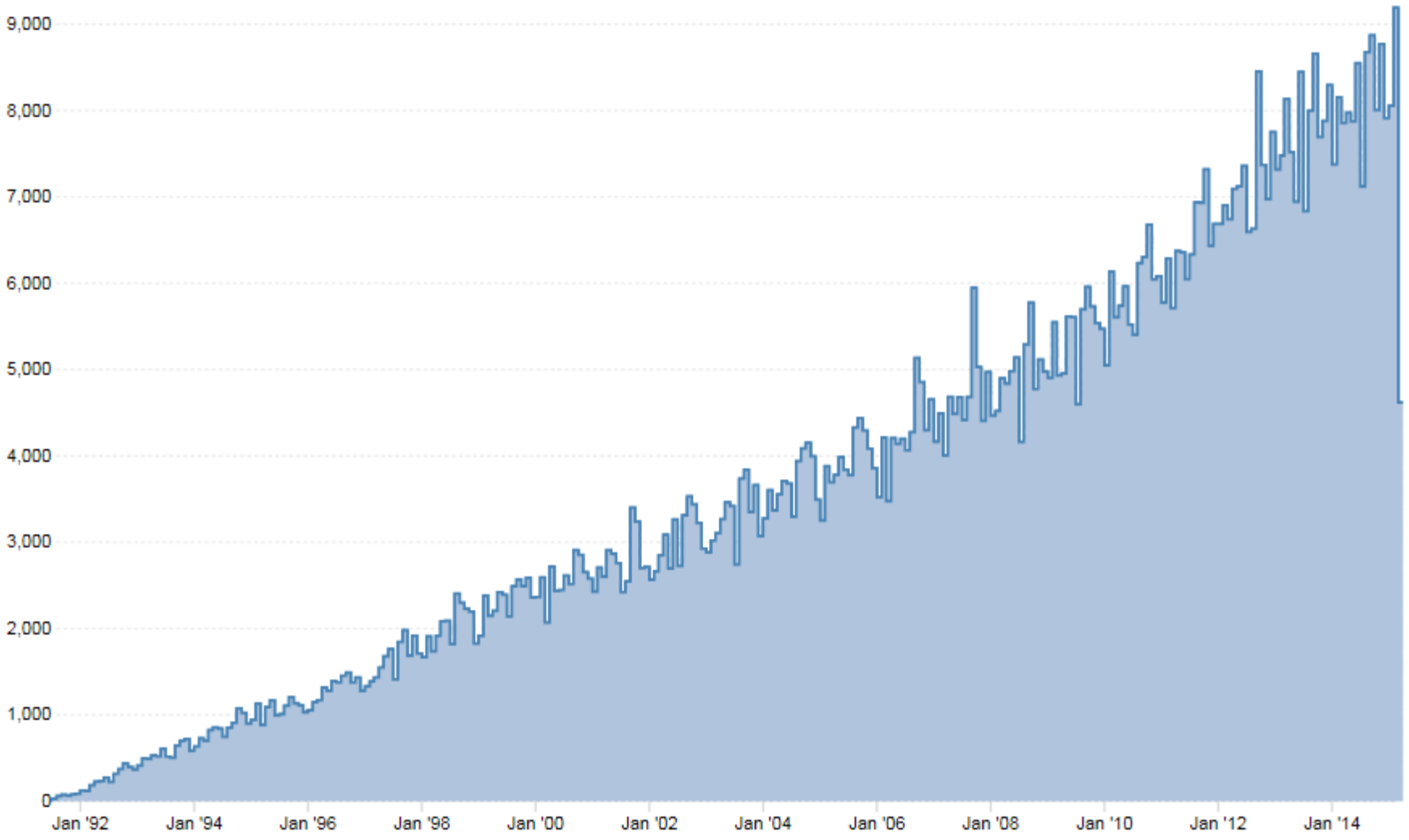
Overview

- Background, status, objectives
- Brief review of arXiv article processing
- Current arXiv repository features
- OA mandates and new requirements
- arXiv support and governance

Background

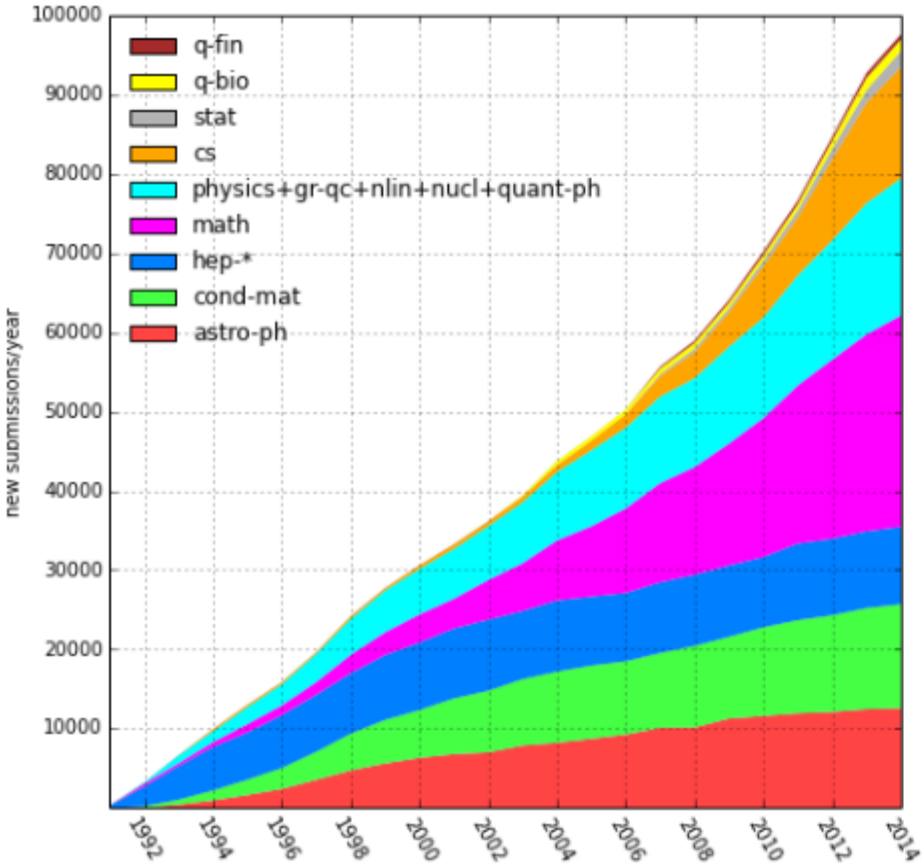
- A moderated distribution service for research in physics, math, computer science, quantitative biology, quantitative finance, and statistics (users of TeX).
- Established at LANL in 1991
- Operated by Cornell University Library since 2001
- Author submitted content, typically article-length e-prints
- Open repository: no fee for submitting or downloading articles
- Current article count: 1,030,637
- 2014 statistics:
  - 97,517 submissions
  - 91.1 million downloads

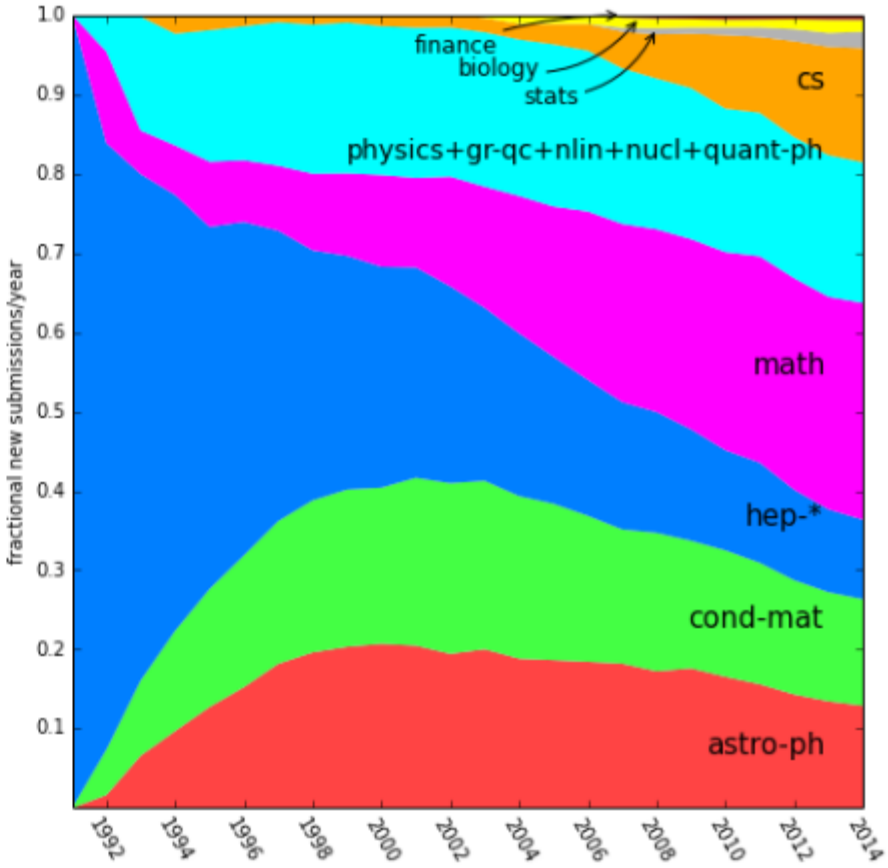
arXiv monthly submission statistics



arXiv submission statistics

Data for 1991 through 2014, updated 31 December 2014.





Primary objectives

- Rapid dissemination of research
- Perpetual, barrier-free access to all accepted submissions
- Accurate and persistent record of research scholarship and priority

arXiv article processing

- Five-screen submission process
  - Agree to arXiv policies and grant license
  - Upload file(s
  - Confirm TeX file has processed correctly
  - Enter metadata
  - Confirm your submission
- Submission details go to subject moderators
  - Is it scientific research?
  - Is it of interest, relevance, and value to a particular research community
- Paper slotted for release within 24 hours, unless flagged by moderator or automated checks

Start >> Add Files >> Process >> **Metadata** >> Preview

Enter Metadata: Title, Authors, Abstract, Comments, etc.

Save and Continue

*Title:

*Author(s): (first names first; do not use et al.; separate with commas or 'and'; see linked help)

*Abstract:

Comments: (e.g.: 10 pages, 5 figures, conference or other essential info)

Report number: (local report number, otherwise *leave blank*)

Journal reference: (full biblio info; *only* if already "published", otherwise *leave blank*)

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ACM class: (optional; delimit multiple entries with semicolons, e.g. F.2.2; I.2.7, see system)

MSC class: (ams.org)

Save and Continue

Current arXiv repository features (relevant to OA mandates)

- Widely and heavily used by practicing researchers
- Openly accessible content
- Commitment to persistence
- Strictly controlled versioning and alteration/removal procedures
- Accepts modest sized “ancillary files” (datasets) associated with articles
- Users can associate ORCID iDs with their arXiv accounts
- Submitters can assign any CC license to their work

Astrophysics > Cosmology and Nongalactic Astrophysics

Colliding clusters and dark matter self-interactions

Felix Kahlhoefer (Oxford), Kai Schmidt-Hoberg (CERN), Mads T. Frandsen (CP3-Origins), Subir Sarkar (Oxford)

(Submitted on 15 Aug 2013 (v1), last revised 17 Jan 2014 (this version, v2))

When a dark matter halo moves through a background of dark matter particles, self-interactions can lead to both deceleration and evaporation of the halo and thus shift its centroid relative to the collisionless stars and galaxies. We study the magnitude and time evolution of this shift for two classes of dark matter self-interactions, viz. frequent self-interactions with small momentum transfer (e.g. due to long-range interactions) and rare self-interactions with large momentum transfer (e.g. contact interactions), and find important differences between the two cases. We find that neither effect can be strong enough to completely separate the dark matter halo from the galaxies, if we impose conservative bounds on the self-interaction cross-section. The majority of both populations remain bound to the same gravitational potential and the peaks of their distributions are therefore always coincident. Consequently any apparent separation is mainly due to particles which are leaving the gravitational potential, so will be largest shortly after the collision but not observable in evolved systems. Nevertheless the fraction of collisions with large momentum transfer is an important characteristic of self-interactions, which can potentially be extracted from observational data and provide an important clue as to the nature of dark matter.

Comments:	13 pages + appendices, 8 figures, v2: minor corrections, references added - matches published version
Subjects:	**Cosmology and Nongalactic Astrophysics (astro-ph.CO)**; High Energy Physics - Phenomenology (hep-ph)
Journal reference:	MNRAS 437 (2014) 2865-2881
DOI:	10.1093/mnras/stt2097
Report number:	CERN-PH-TH/2013-194, NSF-KITP-13-140, CP3-Origins-2013-029 DNRF90, DIAS-2013-29, OUTP-13-14P
Cite as:	**arXiv:1308.3419 [astro-ph.CO]** (or **arXiv:1308.3419v2 [astro-ph.CO]** for this version)

Submission history

From: Felix Kahlhoefer [view email]
[v1] Thu, 15 Aug 2013 14:44:22 GMT (703kb,D)
[v2] Fri, 17 Jan 2014 18:38:33 GMT (730kb,D)

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Comments:	12 pages + appendices, 8 figures
Subjects:	**Cosmology and Nongalactic Astrophysics (astro-ph.CO)**; High Energy Physics - Phenomenology (hep-ph)
Journal reference:	MNRAS 437 (2014) 2865-2881
DOI:	10.1093/mnras/stt2097
Report number:	CERN-PH-TH/2013-194, NSF-KITP-13-140, CP3-Origins-2013-029 DNRF90, DIAS-2013-29, OUTP-13-14P
Cite as:	**arXiv:1308.3419 [astro-ph.CO]** (or **arXiv:1308.3419v1 [astro-ph.CO]** for this version)

Submission history

From: Felix Kahlhoefer [view email]
[v1] Thu, 15 Aug 2013 14:44:22 GMT (703kb,D)
[v2] Fri, 17 Jan 2014 18:38:33 GMT (730kb,D)

High Energy Physics - Phenomenology

Generalised form factor dark matter in the Sun

Aaron C. Vincent (Durham U., IPPP), Aldo Serenelli (ICE - CSIC/IEEC), Pat Scott (Imperial Coll., London)

(Submitted on 16 Apr 2015)

We study the effects of energy transport in the Sun by asymmetric dark matter with momentum and velocity-dependent interactions, with an eye to solving the decade-old Solar Abundance Problem. We study effective theories where the dark matter-nucleon scattering cross-section goes as $v_{\rm rel}^{2n}$ and q^{2n} with $n = -1, 0, 1$ or 2, where $v_{\rm rel}$ is the dark matter-nucleon relative velocity and q is the momentum exchanged in the collision. Such cross-sections can arise generically as leading terms from the most basic nonstandard DM-quark operators. We employ a high-precision solar simulation code to study the impact on solar neutrino rates, the sound speed profile, convective zone depth, surface helium abundance and small frequency separations. We find that the majority of models that improve agreement with the observed sound speed profile and depth of the convection zone also reduce neutrino fluxes beyond the level that can be reasonably accommodated by measurement and theory errors. However, a few specific points in parameter space yield a significant overall improvement. A 3-5 GeV DM particle with $\sigma_{SI} \propto q^2$ is particularly appealing, yielding more than a 6σ improvement with respect to standard solar models, while being allowed by direct detection and collider limits. We provide full analytical capture expressions for q- and $v_{\rm rel}$-dependent scattering, as well as complete likelihood tables for all models.

Comments: 43 pages, 18 figures. Ancillary file likelihood_solarDM.dat provides tabulated neutrino fluxes, surface helium, convective zone radius and sound speed for a set of models presented in this work. We also provide chi-squared values for these observables and the small frequency separations, and the total chi-squared used to derive our constraints

Subjects: **High Energy Physics - Phenomenology (hep-ph)**; Cosmology and Nongalactic Astrophysics (astro-ph.CO); Solar and Stellar Astrophysics (astro-ph.SR)

Report number: IPPP/15/21 DCPT/15/42

Cite as: **arXiv:1504.04378 [hep-ph]**
(or **arXiv:1504.04378v1 [hep-ph]** for this version)

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- HEFCE, REF, RCUK
- OpenAIRE
- EU Horizon 2020
- FP7
- US federal agencies responding to 2013 White House directive to ensure public access to research: NSF, DOE, NASA
- CHORUS, SHARE

Open access, or public access, mandates

- Expand (complicate) article metadata to include:
  - Project identifier and funding agencies
  - Date of acceptance
  - Status of manuscript
- Improve author identification and affiliation tools
  - Promote the use of ORCID iDs in arXiv
  - Improve collection of author and affiliation data at submission time
  - Legacy author and affiliation data
- Improve license data for arXiv articles
- Allow institutional repositories to pull arXiv articles

New arXiv features being discussed

arXiv support and governance

- Support model
  - Institutions worldwide
  - Simons Foundation
  - Cornell University Library
- Two advisory boards
  - Scientific Advisory Board
  - Member Advisory Board
- JISC is a member of MAB
- Current sub-committee of MAB looking at arXiv/IR interoperability, to identify needs

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6	u-tokyo.ac.jp	1.31%	210698
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