

Module 2:  
Using Astronomical Databases



Activity 1:

**Online Article and Preprint Databases**

# Summary

The Internet is useful for many things besides surfing and checking e-mail. It is also a valuable research tool.

In this Activity we will examine how to use online databases to find important journal articles and research publications.

Today's electronic library is an essential 'tool of modern astronomy'.



## Note on publication databases

While such online databases are invaluable sources of information for professional astronomers, they can at times present that information in quite technical language.

When researching essays and projects for Swinburne Astronomy Online, if you find that the resources in these databases are too technical for you, it is definitely acceptable to use articles in astronomy magazines (e.g. Sky & Telescope, Astronomy, Astronomy Now etc.), books about astronomy and (reputable) websites as your reference sources instead. However, we encourage everyone to try and utilise original sources wherever possible!

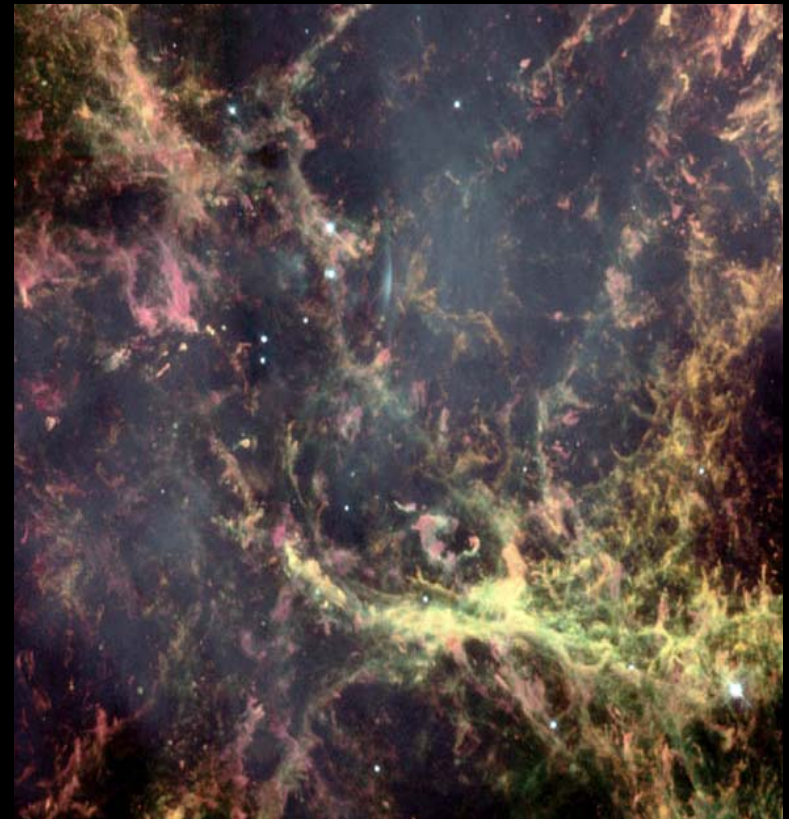


# Getting started

Imagine that you are an astronomy research student, and have been invited to give a presentation to your research group about your favourite astronomical object.

You think you would like to talk about the Crab pulsar and its associated supernova remnant.

Where should you begin?



**The Crab supernova remnant**

# Introducing NASA's ADS

The best place to start doing serious research for your presentation is **NASA's Astrophysical Data System**, affectionately known to astronomers as "ADS".

**ADS** is an extensive database of articles that have been published in scientific journals. Quite literally, the ADS is the foremost portal to the world's body of modern astronomical knowledge.



Let's have a look at the ADS website.

The articles housed there pertain to all kinds of astronomical phenomena, both observed and theoretical, and some of them can be quite tough-going.

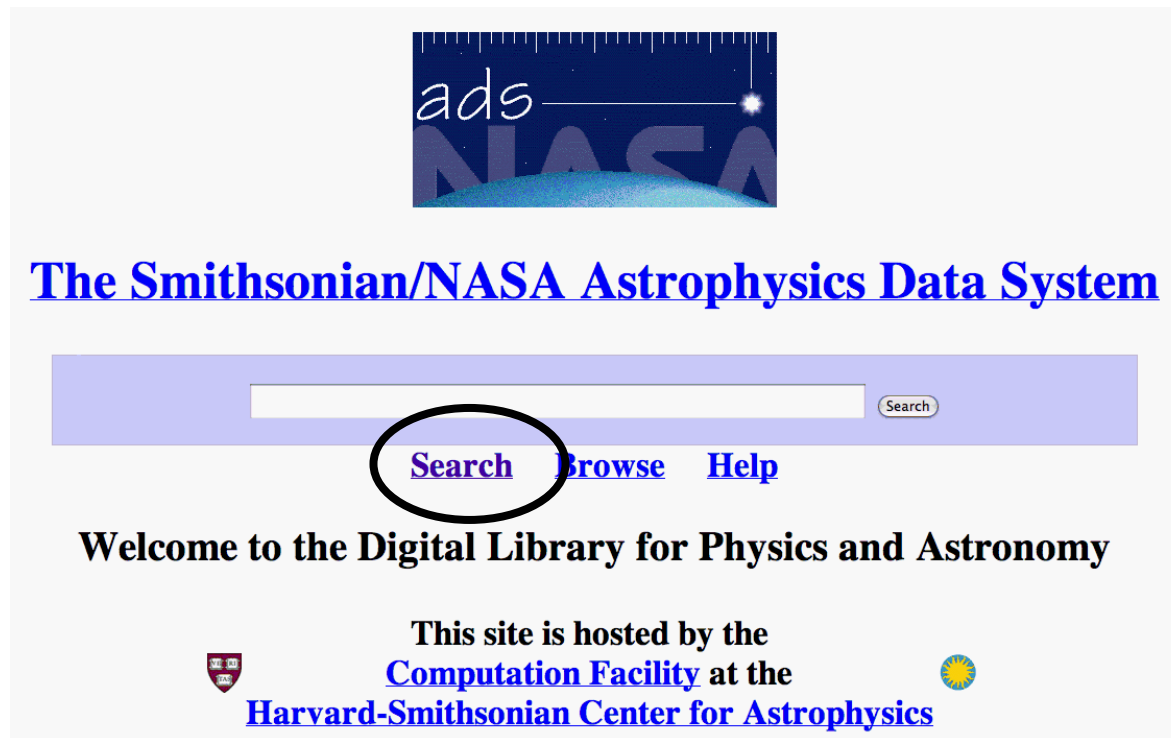
Don't be disheartened though - the papers available through ADS are written by professional astronomers who are engaged in original and highly specialised research.

For this Activity, you should visit the ADS website yourself. The URL is <http://www.adsabs.harvard.edu>. The following slides will help us with some basic site navigation.



# The ADS website

To begin your research about the Crab pulsar, you can look at the titles and abstracts in the ADS database.



The screenshot shows the homepage of the ADS website. At the top is a logo with 'ads' in white and 'NASA' in blue over a blue globe. Below the logo is the title 'The Smithsonian/NASA Astrophysics Data System' in blue. A search bar with a 'Search' button is present. The 'Search' link is circled in black. Below the search bar are the links 'Search', 'Browse', and 'Help'. The main heading reads 'Welcome to the Digital Library for Physics and Astronomy'. At the bottom, it states 'This site is hosted by the Computation Facility at the Harvard-Smithsonian Center for Astrophysics' with the Harvard and Smithsonian logos.

**ads**  
**NASA**

**The Smithsonian/NASA Astrophysics Data System**

Search

[Search](#) [Browse](#) [Help](#)

**Welcome to the Digital Library for Physics and Astronomy**

This site is hosted by the  
**Computation Facility** at the  
**Harvard-Smithsonian Center for Astrophysics**

An **abstract** is a brief paragraph that describes a journal article and its main conclusions.

To find out more about the Crab pulsar and supernova remnant, you want to look at the astronomy and astrophysics abstracts.



This site is hosted by the  
**Computation Facility** at the  
**Harvard-Smithsonian Center for Astrophysics**



The Smithsonian/NASA Astrophysics Data System Abstract Service provides a gateway to the online Astronomy and Physics literature. You can navigate this content using the following query interfaces:

- **Basic Search**, which searches the entire body of literature (5,485,030 records) currently indexed in the ADS.
- **Astronomy and Astrophysics Search**, an advanced interface which searches the 1,353,112 records currently in the Astronomy database, including 117,616 abstracts from Planetary Sciences and Solar Physics journals
- **Physics and Geophysics Search**, an advanced interface which searches the 3,343,715 records currently in the Physics database, including 413,041 abstracts from **APS** journals and 248,081 abstracts from **SPIE** conference proceedings
- **arXiv Preprints Search**, an advanced interface which searches the 421,361 records consisting of all the papers published in the **arXiv e-print archive**
- **Science Education Search**, a basic interface to the literature in Science Education Research and related publications (a selected subset of publications from the above databases)





You can find abstracts for your presentation using a variety of search criteria such as **author**, **date of publication**, **title** or **keyword**.

The ADS query form looks daunting, but it is really quite simple to use. Let's look at each of the relevant fields.



# Searching by Keyword

To get a feel for the information that is available on ADS about the Crab pulsar and its supernova remnant, we'll search the database using the **keyword** field.

Enter **Abstract Words/Keywords**  Require text for selection  
(Combine with:  OR  **AND**  [simple logic](#)  [boolean logic](#))  
Crab pulsar supernova remnant

When you have typed in the above four keywords, select the tick box “Require text for selection”, and select “and” rather than “or”.

Next, click on the **Send Query** button.

Send Query

Return Query Form

Store Default Form

Clear



# A list of articles


ADS searches its database and returns a list of articles that satisfy your criteria. In this case, we might be returned with a list like this...

## Smithsonian/NASA Astrophysics Data System (ADS)

### Query Results from the ADS Database

[Go to bottom of page](#)

Retrieved **100** abstracts, starting with number **1**. Total number selected: **495**.

Sort options 

#	Bibcode Authors	Score	Date	<a href="#">List of Links</a> <a href="#">Access Control Help</a>				
1	<input type="checkbox"/> <a href="#">2007arXiv0704.0973L</a> Lu, Fangjun; Wang, Q. Daniel; Gotthelf, E. V.; Qu, Jinlu	1.000	04/2007	<a href="#">A</a>	<a href="#">X</a>	<a href="#">R</a>	<a href="#">U</a>	
2	<input type="checkbox"/> <a href="#">2007Ap&amp;SS.tmp..145G</a> Gallant, Yves A.	1.000	04/2007	<a href="#">A</a>	<a href="#">E</a>	<a href="#">L</a>	<a href="#">X</a>	<a href="#">R</a> <a href="#">C</a> <a href="#">U</a>
3	<input type="checkbox"/> <a href="#">2007ApJ...656.1038D</a> Deshpande, Avinash A.; Radhakrishnan, V.	1.000	02/2007	<a href="#">A</a>	<a href="#">E</a>	<a href="#">F</a>	<a href="#">L</a>	<a href="#">X</a> <a href="#">R</a> <a href="#">C</a> <a href="#">S</a> <a href="#">U</a>



# Searching by Author's name

Your friend has recommended an article on pulsars and supernova by an astronomer called Richard Manchester.

Let's do a search for **Manchester** in the **author** field.

First, remove your previous selection criteria, then type the author's surname and click on the **Send Query** button.

---

Databases to query:  [Astronomy](#)  [Physics](#)  [arXiv e-prints](#)

---

**Authors:** (Last, First M, one per line)  [SIMBAD](#)  [NED](#)  [LPI](#)  [IAUC Objects](#)

[Exact name matching](#)  [Object name/position search](#)

Require author for selection  Require object for selection

(  OR  AND  [simple logic](#) ) (Combine with:  OR  AND)




It seems that Richard Manchester has written many papers! You can scroll through the list of abstracts until you find the one you need, or you can go back and refine your search.

### [Smithsonian/NASA Astrophysics Data System \(ADS\)](#)

#### Query Results from the ADS Database

[Go to bottom of page](#)

Retrieved 100 abstracts, starting with number 1. Total number selected: 664.

Sort options 

#	Bibcode Authors	Score	Date	List of Links Access Control Help			
1	<a href="#">2007MNRAS.377.1383W</a> Wang, N.; Manchester, R. N.; Johnston, S.	1.000	05/2007	<a href="#">A</a> <a href="#">E</a> <a href="#">F</a> <a href="#">L</a>	<a href="#">R</a>	<a href="#">U</a>	
2	<a href="#">2007arXiv0705.3269L</a> Lorimer, D. R.; Freire, P. C. C.; Stairs, I. H.; Kramer, M.; McLaughlin, M. A.; Burgay, M.; Thorsett, S. E.; Dewey, R. J.; Lyne, A. G.; Manchester, R. N.; <b>and</b> <b>3 coauthors</b>	1.000	05/2007	<a href="#">A</a>	<a href="#">X</a>	<a href="#">R</a>	
3	<a href="#">2007arXiv0705.2780L</a> Liu, Y.; Manchester, W. B., IV; Kasper, J. C.; Richardson, J. D.; Belcher, J. W.	1.000	05/2007	<a href="#">A</a>	<a href="#">X</a>	<a href="#">R</a>	<a href="#">U</a>



# Searching by Publication Date

You remember that the paper by Richard Manchester was published a little more than a decade ago.

Let's try to refine our search using the **date** field.

Send Query

Return Query Form

Store Default Form

Clear

Databases to query:  [Astronomy](#)  [Physics](#)  [arXiv e-prints](#)

**Authors:** (Last, First M, one per line)  [SIMBAD](#)  [NED](#)  [LPI](#)  [IAUC Objects](#)

 [Exact name matching](#)
 [Object name/position search](#)
 Require author for selection

 Require object for selection

 OR  AND  [simple logic](#)

 (Combine with:  OR  AND)

Publication Date between   and    
 (MM) (YYYY) (MM) (YYYY)



# Searching by Title

You might also remember that Manchester's article was called **Pulsar-supernova remnant associations**.

In this case, you can refine your search further by entering important words from the **title**.

**Authors:** (Last, First M, one per line)  **SIMBAD**  **NED**  **LPI**  **IAUC Objects**

**Exact name matching**  **Object name/position search**

**Require author for selection**  **Require object for selection**

(  **OR**  **AND**  **simple logic** ) (Combine with:  **OR**  **AND** )

**Publication Date** between  and

(MM) (YYYY) (MM) (YYYY)

**Enter Title Words**  **Require title for selection**

(Combine with:  **OR**  **AND**  **simple logic**  **boolean logic** )



# The ADS results page

Let's have a look at the results of our search.

We have found the abstract we are looking for...

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1	<a href="#">1998MmSAI..69..801M</a>	1.000 00/1998	Scanned Article (GIF)	<a href="#">C</a>	<a href="#">S</a>	<a href="#">U</a>			
	Manchester, R. N.								
2	<a href="#">1994PASAu..11...78M</a>	1.000 04/1994	<a href="#">A</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">C</a>	<a href="#">S</a>	<a href="#">N</a>	<a href="#">U</a>
	Manchester, R. N.								

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but what do these letters mean?



Clicking on [A](#) will take you to the abstract (as will clicking on the left-most entry near the number and tick box).

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1 <input type="checkbox"/>	1.000 00/1998	<a href="#">Scanned Article (GIF)</a>	<a href="#">C</a>	<a href="#">S</a>	<a href="#">U</a>			
<a href="#">1998MmSAI..69..801M</a>	Manchester, R. N.	Radio searches for pulsars associated with supernova remnants						
<hr/>								
2 <input type="checkbox"/>	1.000 04/1994	<a href="#">A</a>	<a href="#">F</a>	<a href="#">G</a>	<a href="#">C</a>	<a href="#">S</a>	<a href="#">N</a>	<a href="#">U</a>
<a href="#">1994PASAu..11...78M</a>	Manchester, R. N.	Pulsar-supernova remnant associations						

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Clicking on [F](#) or [G](#) will download an electronic version of the whole article.

- 
- |       |                                     |               |   |                   |                   |                                     |
|-------|-------------------------------------|---------------|---|-------------------|-------------------|-------------------------------------|
| 1     | <a href="#">1998MmSAL..69..801M</a> | 1.000 00/1998 | Scanned Article (GIF)   | <a href="#">C</a> | <a href="#">S</a> | <a href="#">U</a>                   |
|       | Manchester, R. N.                   |               | Radio searches for pulsars associated with supernova remnants |                   |                   |                                     |
| <hr/> |                                     |               |   |                   |                   |                                     |
| 2     | <a href="#">1994PASAu..11...78M</a> | 1.000 04/1994 | <a href="#">A</a> <a href="#">F</a> <a href="#">G</a>         | <a href="#">C</a> | <a href="#">S</a> | <a href="#">N</a> <a href="#">U</a> |
|       | Manchester, R. N.                   |               | Pulsar-supernova remnant associations                         |                   |                   |                                     |
- 

But let's have a look at the abstract first.



# Reading the abstract

This is the abstract to Richard Manchester's article.

**Title:** Pulsar-supernova remnant associations  
**Authors:** [Manchester, R. N.](#)  
**Affiliation:** AA(Australia Telescope National Facility, Australia)  
**Publication:** Astronomical Society of Australia, Proceedings, vol. 11, no. 1, p. 78  
**Publication Date:** 04/1994  
**Category:** Astrophysics  
**Origin:** [STI](#)  
**NASA/STI Keywords:** PULSARS, STAR FORMATION, SUPERNOVA REMNANTS, ASTROPHYSICS, RADIO EMISSION  
**Bibliographic Code:** 1994PASAu..11...78M

## Abstract

Pulsars and supernova remnants (SNRs) are both believed to be formed in the supernova explosions of massive stars. Therefore one might expect to see associations between the two classes of object. In fact, up until a couple of years ago, there was only a handful of believable associations and even now there are only nine or ten. It is relatively easy to explain why such a small fraction of the 600 or so known pulsars are associated with supernova remnants. The average pulsar lifetime is of the order of  $10^6$  years, whereas the average supernova remnant is detectable for about  $10^4$  years. Therefore, one would expect only about one percent of pulsars to be still associated, as is observed. It is somewhat more difficult to explain why so few of the 150 known supernova remnants have associated pulsars. The main factor is that supernova remnants are seen throughout the Galaxy whereas most pulsars are detectable only relatively close to the Sun, within a few kiloparsec. Another factor is that pulsar emission is beamed, so even if a pulsar exists in a relatively nearby supernova remnant, it may be undetectable. The most believable of the suggested associations are listed. Associations which are possible but by no means certain are indicated by question mark. For the more certain associations, the pulsar position is within the SNR boundaries (an exception is 'The Duck', where the pulsar is at the tip of the 'beak'), the distance estimates for the pulsar and SNR are compatible, and the age estimates are likewise compatible. References to most of these associations may be found in the pulsar catalog of Taylor, Manchester and Lyne (1993, *Astrophys. J. Suppl.*, 88, 529). Recent references not included in the catalog are for PSR B1706-44 (McAdam, Osborne and Parkinson, 1993, *Nature*, 361, 516) and PSR B2334+61 (Kulkarni et al., 1993, *Nature*, 362, 135).



## Don't ignore the header information!

**Title:** Pulsar-supernova remnant associations  
**Authors:** [Manchester, R. N.](#)  
**Affiliation:** AA(Australia Telescope National Facility, Australia)  
**Publication:** Astronomical Society of Australia, Proceedings, vol. 11, no. 1, p. 78  
**Publication Date:** 04/1994  
**Category:** Astrophysics  
**Origin:** [STI](#)  
**NASA/STI Keywords:** PULSARS, STAR FORMATION, SUPERNOVA REMNANTS, ASTROPHYSICS, RADIO EMISSION  
**Bibliographic Code:** 1994PASAu...11...78M

In addition to the author(s), date of publication and title of the article, the header also tells you the journal in which the article is published and keywords that describe the subject.

This is particularly useful if you want to search for other abstracts or articles on the same topic.



## Downloading the article

You read the abstract and decide that you'd like to read the whole article.

▣ [1994PASAu..11...78M](#)

1.000 04/1994 A

F G

C

S N

U

Manchester, R. N.

Pulsar-supernova remnant associations

Do you remember the F and G? Many complete articles are available directly from ADS, so you don't even have to leave your computer screen.

Clicking on G will take you to the article displayed in GIF format. GIF format is mainly used for older articles.

Clicking on F will take you to the (preferable) PDF version of the file.



Papers that are marked with an E are available online in 'E'lectronic format. This often involves directing you to the journal's website.

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4  [2001ApJ...557L..51C](#) 1.000 08/2001 [A](#) [E](#) [E](#) [L](#) [X](#) [R](#) [C](#) [S](#) [U](#) [H](#)  
Camilo, F.; Bell, J. F.; PSR J1016-5857: A Young Radio Pulsar with Possible Supernova Remnant, X-Ray, and  
Manchester, R. N.; Lyne, A. G.; Gamma-Ray Associations  
Possenti, A.; Kramer, M.;  
Kaspi, V. M.; Stairs, I. H.;  
D'Amico, N.; Hobbs, G.; and 2  
coauthors

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Some online journals require users to pay subscription charges to read their latest articles. In this case, you may have to copy down the header information from the abstract and then visit your library!

Alternatively, if the paper is post-1991, you may find a free pre-print at arxiv.org (discussed later).



# References and citations

Another useful feature of the ADS database is that it can generate a list of references and citations for most articles.

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4  [2001ApJ...557L..51C](#) 1.000 08/2001 [A](#) [E](#) [F](#) [L](#) [X](#) [R](#) [C](#) [S](#) [U](#) [H](#)  
Camilo, F.; Bell, J. F.; PSR J1016-5857: A Young Radio Pulsar with Possible Supernova Remnant, X-Ray, and  
Manchester, R. N.; Lyne, A. G.; Gamma-Ray Associations  
Possenti, A.; Kramer, M.;  
Kaspi, V. M.; Stairs, I. H.;  
D'Amico, N.; Hobbs, G.; and 2  
coauthors

---

**References** ([R](#)) are the articles that appear in the bibliography of the paper you are looking at.

**Citations** ([C](#)) are from subsequent articles that mention the paper as support for their arguments.



You can use the reference list to find more background information about the ideas that appear in an article.

---

4  [2001ApJ...557L..51C](#) 1.000 08/2001 [A](#) [E](#) [F](#) [L](#) [X](#) [R](#) [C](#) [S](#) [U](#) [H](#)  
 Camilo, F.; Bell, J. F.; PSR J1016-5857: A Young Radio Pulsar with Possible Supernova Remnant, X-Ray, and  
 Manchester, R. N.; Lyne, A. G.; Gamma-Ray Associations  
 Possenti, A.; Kramer, M.;  
 Kaspi, V. M.; Stairs, I. H.;  
 D'Amico, N.; Hobbs, G.; **and 2**  
**coauthors**

---

You can use the citation list, on the other hand, to find more recent articles which in turn cite the article. Citations therefore reflect the importance of an article (and also, of course, how long the paper has been around to accrue citations).





Clicking on the 'C'itations link yields a new list of article, that may appear something like this.

### [Smithsonian/NASA Astrophysics Data System \(ADS\)](#)

Citations for [2001ApJ...557L..51C](#) from the ADS Databases

[Go to bottom of page](#)

The Citation database in the ADS is NOT complete. Please keep this in mind when using the [ADS Citation lists](#).

Selected and retrieved **26** abstracts. ([Citation History](#))

Sort options

#	Bibcode Authors	Cites Title	Date	<a href="#">List of Links</a> <a href="#">Access Control Help</a>
1	<a href="#">2007astro.ph..2571T</a> Tagieva, Sevinc O.; Ankey, Askin; Ankey, Arzu M.	1.000	02/2007	<a href="#">A</a> <a href="#">X</a> <a href="#">R</a> <a href="#">U</a> <a href="#">H</a>
2	<a href="#">2006ApJ...652..1523B</a> Blazek, J. A.; Gaensler, B. M.; Chatterjee, S.; van der Swaluw, E.; Camilo, F.; Stappers, B. W.	1.000	12/2006	<a href="#">A</a> <a href="#">E</a> <a href="#">F</a> <a href="#">L</a> <a href="#">X</a> <a href="#">R</a> <a href="#">C</a> <a href="#">S</a> <a href="#">U</a>

(May 2007)



# Late-breaking news!

Of course, it takes time for articles to be approved for publication and subsequently printed. Scientific papers are refereed by the author's peers and colleagues and may be extensively redrafted prior to approval. This process can take several months.

However, you would like to conclude your presentation to the astronomy class by talking about the latest exciting developments in our understanding of the Crab pulsar and supernova remnant.

For this, you need to visit a **pre-print** database.



# Introducing arXiv.org and astro-ph

The most popular archive for astronomical pre-prints is **astro-ph**. You may have noticed that ADS has links to papers in this repository.

As a part of this Activity you should visit the astro-ph archive which resides within the arXiv.org website.

The URL is <http://xxx.lanl.gov/archive/astro-ph>.



In many ways, astro-ph is just like ADS.

Instead of housing published articles and their abstracts, astro-ph is a database for pre-prints.

A pre-print is a journal article “in the making”. The authors have submitted the pre-print to a scientific journal but it has not yet been accepted for publication.

The pre-prints available at astro-ph are updated daily, but you need to remember that the ideas presented in pre-prints may be controversial. Pre-prints may not always be published formally, and their findings may be contested strongly by other scientists.



# The astro-ph archive

You can access pre-prints from the astro-ph database in a number of ways.

## Author/title/abstract search

Select subject areas to restrict search (default is to search all subject areas)

- Computer Science  Mathematics  Nonlinear Sciences  Physics [archive: astro-ph]
- Quantitative Biology  Statistics

Select years to search (default is to search all years)

- Past year or the year  or the years from  to

Author(s):	<input type="text"/>	AND	<input type="text"/>
Title:	<input type="text"/>	AND	<input type="text"/>
Abstract:	<input type="text"/>		

Show  hits per page

or  selections to default values.



# The astro-ph archive

You can access pre-prints from the astro-ph database in a number of ways.

Searching by Author and year is a popular approach.

## Author/title/abstract search

Select subject areas to restrict search (default is to search all subject areas)

- Computer Science  Mathematics  Nonlinear Sciences  Physics [archive: astro-ph]
- Quantitative Biology  Statistics

Select years to search (default is to search all years)

- Past year or the year 2001 or the years from  to

Author(s): camilo AND

Title: AND

Abstract:

Show 25 hits per page

Do Search or Reset selections to default values.



# The astro-ph archive

You can access pre-prints from the astro-ph database in a number of ways.

Searching by Title is also a useful method.

## Author/title/abstract search

Select subject areas to restrict search (default is to search all subject areas)

- Computer Science  Mathematics  Nonlinear Sciences  Physics [archive: astro-ph]  Quantitative Biology  Statistics

Select years to search (default is to search all years)

- Past year or the year 2001 or the years from  to

Author(s):  AND

Title:  pulsar supernova AND

Abstract:

Show  25 hits per page

or  selections to default values.



# The astro-ph archive

You can access pre-prints from the astro-ph database in a number of ways.

If known, one can enter details of the Journal reference

## Author/title/abstract search

Select subject areas to restrict search (default is to search all subject areas)

- Computer Science  Mathematics  Nonlinear Sciences  Physics [archive: astro-ph]
- Quantitative Biology  Statistics

Select years to search (default is to search all years)

- Past year or the year 2001 or the years from  to

Journal-ref: 557 L51 AND

Author(s): AND

Abstract:

Show 25 hits per page

Do Search or Reset selections to default values.





# The astro-ph archive

All of the previous approaches should lead one to the following article which we have already seen on ADS.

Showing results 1 through 1 (of 1 total) for **jr:(557 AND L51)**

1. [arXiv:astro-ph/0107180](https://arxiv.org/abs/astro-ph/0107180) [ps, pdf, other] :

Title: **PSR J1016-5857: a young radio pulsar with possible supernova remnant, X-ray, and gamma-ray associations**

Authors: **F. Camilo** (1), **J. F. Bell** (2), **R. N. Manchester** (2), **A. G. Lyne** (3), **A. Possenti** (4), **M. Kramer** (3), **V. M. Kaspi** (5), **I. H. Stairs** (6), **N. D'Amico** (4), **G. Hobbs** (3), **E. V. Gotthelf** (1), **B. M. Gaensler** (7) ((1) Columbia, (2) ATNF, (3) Jodrell Bank, (4) Bologna, (5) McGill, (6) NRAO, (7) MIT)

Comments: 5 pages, 3 included figures, accepted for publication by ApJ Letters

Journal-ref: *Astrophys.J.* 557 (2001) L51

Clicking on the article's reference number (astro-ph/0107180) will take one to the Abstract.



# Viewing the Preprint

The result is shown below.

The preferred download format is PDF or PostScript.

## Astrophysics

### PSR J1016–5857: a young radio pulsar with possible supernova remnant, X–ray, and gamma–ray associations

F. Camilo (1), J. F. Bell (2), R. N. Manchester (2), A. G. Lyne (3), A. Possenti (4), M. Kramer (3), V. M. Kaspi (5), I. H. Stairs (6), N. D'Amico (4), G. Hobbs (3), E. V. Gotthelf (1), B. M. Gaensler (7) ((1) Columbia, (2) ATNF, (3) Jodrell Bank, (4) Bologna, (5) McGill, (6) NRAO, (7) MIT)

*(Submitted on 10 Jul 2001)*

We report the discovery of a young and energetic pulsar in the Parkes multibeam survey of the Galactic plane. PSR J1016–5857 has a rotation period of 107 ms and period derivative of  $8e-14$ , implying a characteristic age of 21 kyr and spin-down luminosity of  $2.6e36$  erg/s. The pulsar is located just outside, and possibly interacting with, the shell supernova remnant G284.3–1.8. Archival X–ray data show a source near the pulsar position which is consistent with emission from a pulsar wind nebula. The pulsar is also located inside the error box of the unidentified EGRET source 3EG J1013–5915, for which it represents a plausible counterpart.

Comments: 5 pages, 3 included figures, accepted for publication by ApJ Letters  
Subjects: Astrophysics (astro-ph)  
Journal reference: Astrophys.J. 557 (2001) L51  
Cite as: [arXiv:astro-ph/0107180v1](https://arxiv.org/abs/astro-ph/0107180v1)

## Download:

- [PostScript](#)
- [PDF](#)
- [Other formats](#)

## References & Citations

- [SLAC-SPIRES HEP](#)  
(refers to, cited by, arXiv reformatted)
- [NASA ADS](#)
- [CiteBase](#)

[previous](#) | [next](#)



# The astro-ph archive

Alternatively, if one already knows the astro-ph/ (or arXiv:) reference number, this may be entered directly.

lanl.arXiv.org > search Search or Article-id (Help | Advanced search)

astro-ph/0107180 All papers

## Search arXiv.org

### Author/title/abstract search

Select subject areas to restrict search (default is to search all subject areas)

Computer Science  Mathematics  Nonlinear Sciences  Physics [archive: astro-ph ▾]

Quantitative Biology  Statistics

Select years to search (default is to search all years)

Past year or the year  or the years from  to

Journal-ref:

Title:

Abstract:

Show  hits per page



# What next?

Having visited ADS and arXiv.org's astro-ph, you're beginning to feel like an expert on pulsars and supernova remnants.

However, you would also like to show some real data and images as part of your presentation.

In the next Activity we will investigate some of the online image databases available.



## *End of Activity*

*Press the **ESC** (Escape) key to return  
to the home page for this Module.*

