

The NASA Astrophysics Data System: Metadata Enrichment and Indexing

Edwin Henneken & Steve McDonald

ADS Users Group Meeting
January 17, 2017



Overview

- Enriching the collection
 - Linking to external data archives and full text (external & local)
 - Indexing SIMBAD objects, VizieR Catalogs, NED
 - Graphics
 - Usage data (“Co-Reads”)
 - References and Citations
 - Policy (arXiv vs. published)
 - Associated records

Enriching the collection

THE ASTRONOMICAL JOURNAL, 124:266–293, 2002 July
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DETAILED STRUCTURAL DECOMPOSITION OF GALAXY IMAGES¹

CHEN Y. PENG,² LUIS C. HO,³ CHRIS D. IMPEY,⁴ AND HANS-WALTER RIX⁴

Received 2001 August 10; accepted 2002 March 27

ABSTRACT

We present a two-dimensional fitting algorithm (GALFIT) designed to extract structural components from galaxy images, with emphasis on closely modeling light profiles of spatially well-resolved, nearby galaxies observed with the *Hubble Space Telescope*. Our algorithm improves on previous techniques in two areas: by being able to simultaneously fit a galaxy with an arbitrary number of components and with optimization in computation speed, suited for working on large galaxy images. We use two-dimensional models such as the “Nuker” law, the Sérsic (de Vaucouleurs) profile, an exponential disk, and Gaussian or Moffat functions. The azimuthal shapes are generalized ellipses that can fit disk and boxy components. Some potential applications of our program include: standard modeling of global galaxy profiles; extracting bars, stellar disks, double nuclei, and compact nuclear sources; and measuring absolute dust extinction or surface brightness fluctuations after removing the galaxy model. When examined in detail, we find that even simple looking galaxies generally require at least three components to be modeled accurately, rather than the one or two components more often employed. Many galaxies with complex isophotes, ellipticity changes, and position angle twists can be modeled accurately in two dimensions. We illustrate this by way of 11 case studies, which include regular and barred spiral galaxies, highly disk-like lenticular galaxies, and elliptical galaxies displaying various levels of complexities. A useful extension of this algorithm is to accurately extract nuclear point sources in galaxies. We compare two-dimensional and one-dimensional extraction techniques on simulated images of galaxies having nuclear slopes with different degrees of cuspsiness, and we then illustrate the application of the program to several examples of nearby galaxies with weak nuclei.

Keywords: galaxies: bulges — galaxies: fundamental parameters — galaxies: nuclei — galaxies: structure — techniques: image processing — techniques: photometric

1. INTRODUCTION

Galaxies span a wide range of morphology and luminosity, and a very useful way to quantify them is to fit their light distribution with parametric functions. The de Vaucouleurs $R^{1/4}$ and exponential disk functions became standard functions to use after de Vaucouleurs (1948) showed many elliptical galaxies to have $R^{1/4}$ light distributions, while Freeman (1970) found late-type galaxies to be well described by a de Vaucouleurs bulge plus an exponential disk. Since then the empirical techniques of galaxy fitting and decomposition have led to a number of understanding galaxy formation and evolution. These include investigations into the Tully-Fisher relationship (Tully & Fischer 1977), the fundamental plane of spheroidal galaxies (e.g., 1987; Dressler et al. 1987; Djorgovski & Davis 1987; Bender, Burstein, & Faber 1992), the morphological transformation of galaxies in cluster environments (e.g., Dressler 1980; van Dokkum & Franx 2001), the bimodality of galaxy nuclear cusps (Lauer et al. 1995; Faber et al. 1997) and its implications for the formation of massive black holes (Kormendy, Ho, & Filippenko 2002), and the cosmic evolu-

tion of galaxy morphology (e.g., Lilly et al. 1998; Marleau & Simard 1998).

There are two general types of galaxy fitting: one-dimensional fitting of surface brightness profiles (e.g., Kormendy 1977; Burstein 1979; Burstein 1981; Kent 1985; Baggett, Baggett, & Anderson 1998) and two-dimensional fitting of galaxy images (e.g., Shaw & Gilmore 1989; Byun & Freeman 1995; de Jong 1996; Simard 1998; Wadadekar, Robbison, & Kembhavi 1999; Khosroshahi, Wadadekar, & Kembhavi 2000), each with its own tradeoffs and benefits.

In one dimension an important consideration is how to first obtain a radial surface brightness profile from a two-dimensional image, for which there is no universally agreed upon procedure. A common practice is to use isophote fitting, which is a powerful technique when performed on well-resolved galaxies because it averages over elliptical annuli to increase the signal-to-noise ratio (S/N) at a given radius. However, as many galaxies have isophote twists and changing ellipticity as a function of radius, the galaxy profile is extracted along a radial arc that is ill defined. An alternative approach is to use a direct one-dimensional slice across an image. Burstein (1979) argues that only cuts along the major axis should be used in bulge-to-disk (B/D) decompositions. Meanwhile, Ferrarese et al. (1994) point out that galaxies with power-law central profiles may have different profiles along the major and minor axis.

Fitting profiles in one dimension is frequently used because it suffices for certain goals and is simple to implement. But many studies now resort to two-dimensional techniques. For B/D decomposition a number of authors (e.g., Byun & Freeman 1995; Wadadekar et al. 1999) have

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Bibcode 2002AJ....124..266P

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The screenshot shows the ADS website interface. At the top, the URL is ui.adsabs.harvard.edu. The search bar contains the query "author:~Peng, C* year:2002 bibstem:~AJ". The left sidebar shows navigation options: Abstract, Citations (1311), References (80), Co-Reads, Graphics, Metrics, and EXPORT. The main content area displays the abstract for the paper "Detailed Structural Decomposition of Galaxy Images". The authors listed are Peng, Chien Y.; Ho, Luis C.; Impey, Chris D.; and Rix, Hans-Walter. The abstract text describes a two-dimensional fitting algorithm (GALFIT) designed to extract structural components from galaxy images. The right sidebar contains sections for "FULL TEXT SOURCES" (Publisher PDF, Publisher Article, arXiv e-print), "DATA PRODUCTS" (NED objects, SIMBAD objects, Archival Data), "GRAPHICS" (a small image of a galaxy), and "SUGGESTED ARTICLES" (Early-Type Galaxies in the Sloan Digital Sky Survey).

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Detailed Structural Decomposition of Galaxy Images

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The screenshot shows the ADSbeta interface. The search bar at the top contains the query "author:'^Peng, C*' year:2002 bibstem:'AJ'". The search results list the article "Detailed Structural Decomposition of Galaxy Images" by Peng, Chien Y.; Ho, Luis C.; Impey, Chris D.; Rix, Hans-Walter. The article abstract is displayed, followed by publication details: "The Astronomical Journal, Volume 124, Issue 1, pp. 266-293, July 2002". The DOI is 10.1086/340952. The Bibcode is 2002AJ....124.266P. The keywords are: Galaxies; Bulges; Galaxies: Fundamental Parameters; Galaxies: Nuclei; Galaxies: Structure; Techniques: Image Processing; Techniques: Photometric; Astrophysics. On the right side, under "FULL TEXT SOURCES", there is a link to the "arXiv e-print" which is highlighted with a blue arrow pointing to the text "arXiv match".

arXiv match

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The screenshot shows the arXiv.org interface for the preprint 'Detailed Structural Decomposition of Galaxy Images' by Chien Y. Peng et al. The page is displayed in a browser window with the URL 'ui.adsabs.harvard.edu'. The arXiv.org logo and navigation links are visible at the top. The main content area includes the title, authors, abstract, and a 'Download' section with links for PDF, PostScript, and other formats. The 'Current browse context' section shows the preprint is in the 'astro-ph' category. The 'References & Citations' section lists 'INSPIRE HEP' and 'NASA ADS'. The 'Bookmark' section includes a '1 blog link'. The 'Comments' section shows 29 pages, 14 figures, and 14 accepted figures. The 'Subjects' section lists 'Astrophysics (astro-ph)' and 'Astronomy (astro-ph)'. The 'Journal reference' is 'Astron. J. 124:266-293, 2002'. The 'DOI' is '10.1086/340952'. The 'Cite as' section shows 'arXiv:astro-ph/0204182' and '(or arXiv:astro-ph/0204182v1 for this version)'. The 'Submission history' section shows the preprint was submitted by Chien Peng on 10 Apr 2002. The 'Link back to' section includes 'arXiv', 'form interface', and 'contact'.

ADS Search | [astro-ph/0204182] Detailed Structural Decomposition of Galaxy Images

We gratefully acknowledge support from the Simons Foundation and Stockholm University

arXiv.org > astro-ph > arXiv:astro-ph/0204182

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All papers

Astrophysics

Detailed Structural Decomposition of Galaxy Images

Chien Y. Peng (1), Luis C. Ho (2), Chris D. Impey (1), Hans-Walter Rix (3) ((1) Steward Observatory, (2) The Carnegie Observatories of Washington, (3) MPIA Heidelberg)

(Submitted on 10 Apr 2002)

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Comments: 29 pages, 14 figures, abridged version. Full version AJ accepted. For full version with high resolution figures, go to: this http URL

Subjects: Astrophysics (astro-ph)

Journal reference: Astron. J. 124:266-293, 2002

DOI: 10.1086/340952

Cite as: arXiv:astro-ph/0204182 (or arXiv:astro-ph/0204182v1 for this version)

Submission history

From: Chien Peng [view email]
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The screenshot shows the ADSbeta website interface. At the top, there's a navigation bar with 'adsbeta', 'Feedback', 'ORCID', 'Learn', 'Sign Up', and 'Log In'. Below this is a search bar with a 'QUICK FIELD:' dropdown and a search button. The search results are displayed in a list view, with the first result selected. The result is for a paper titled 'Detailed Structural Decomposition of Galaxy Images' by Peng, Chien Y.; Ho, Luis C.; Impey, Chris D.; Rix, Hans-Walter. The abstract is visible, and there are links to 'FULL TEXT SOURCES' (Publisher PDF, Publisher Article, arXiv e-print) and 'DATA PRODUCTS' (NED objects (11), SIMBAD objects (11), Archival Data (2)). A large arrow points from the 'DATA PRODUCTS' section to the text 'Astronomical Databases (SIMBAD, NED)'. The paper's publication information, including 'The Astronomical Journal, Volume 124, Issue 1, pp. 266-293', is also shown.

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Journal keyword(s): Galaxies: Bulges - Galaxies: Fundamental Parameters - Galaxies: Nuclei - Galaxies: Structure - Techniques: Image Processing - Techniques: Photometric

Simbad objects: 11

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2	NGC 2460	AGN	07 56 52.269	+60 20 57.76		12.5				~	102	0
3	NGC 2787	LIN	09 19 18.538	+69 12 12.24		12.92	11.79			~	276	0
4	NGC 3377	GIP	10 47 42.400	+13 59 08.30	11.55	11.24	10.38			~	661	1
5	NGC 4111	LIN	12 07 03.127	+43 03 55.41	12.07	11.63	10.74			~	268	1
6	NGC 4278	LIN	12 20 06.82563	+29 16 50.7124	11.54	11.09	10.16	11.200		~	808	2
7	NGC 4450	LIN	12 28 29.634	+17 05 05.82		10.90	10.08			~	460	1
8	NGC 4589	LIN	12 37 25.0	+74 11 31		12.0				~	241	2
9	M 59	GIG	12 42 02.322	+11 38 48.95		11.0				~	600	0
10	NGC 5982	LIN	15 38 39.778	+59 21 21.21		12.4				~	254	0
11	NGC 7421	GIG	22 56 54.316	-37 20 49.91	12.61	12.64	11.93	11.71	12.1	~	86	1

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Data Archives

Enriching the collection - Linking: External Data

The screenshot displays the ADS Search interface. The main window shows a table of HST observations with columns: Mark, Dataset, Target Name, RA (J2000), Dec (J2000), Ref, Start Time, Stop Time, Exp Time, Instrument, Apertures, and Filter. The table lists 20 rows of data, including observations of NGC221-NUC and NGC224-NUC. A sidebar on the right contains sections for 'y Images', 'FULL TEXT SOURCES', 'DATA PRODUCTS', 'GRAPHICS', and 'SUGGESTED ARTICLES'. An arrow points from the 'Archival Data (2)' link in the 'DATA PRODUCTS' section to the text 'Data Archives'.

ADS Search

HST (Proposal ID = 5236)

40 rows displayed, but 54 are available.
note: reload page if no results are shown

Table Info

Click on Dataset or Target Name entries to preview information on data set.
Click on Ref entries to display list of published papers.
Click on Proposal ID entries to display information on observing program.
Records with a @ character next to the mark button are proprietary, and may only be retrieved by authorized users.

Click on top column headers to sort the table on the column contents.
Click on bottom column headers for more information about the data in that column.

Plot marked spectra Submit marked data for retrieval from STADS

Mark all Unmark all Mark public Unmark public Mark proprietary Unmark proprietary

Mark	Dataset	Target Name	RA (J2000)	Dec (J2000)	Ref	Start Time	Stop Time	Exp Time	Instrument	Apertures	Filter
<input type="checkbox"/>	U2LGO101T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:16:16	1994-12-26 12:16:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO102T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:18:16	1994-12-26 12:18:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO103T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:20:16	1994-12-26 12:20:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO104T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:22:16	1994-12-26 12:22:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO105T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:25:16	1994-12-26 12:25:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO106T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:27:16	1994-12-26 12:27:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO107T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:29:16	1994-12-26 12:29:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO108T	NGC221-NUC	00 42 39.489	+40 51 46.92	49	1994-12-26 12:31:16	1994-12-26 12:31:42	26.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO201T	NGC224-NUC	00 42 46.909	+41 16 15.93	49	1995-06-19 18:19:17	1995-06-19 18:24:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO202T	NGC224-NUC	00 42 46.910	+41 16 15.95	49	1995-06-19 18:30:17	1995-06-19 18:35:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO203T	NGC224-NUC	00 42 46.911	+41 16 15.92	49	1995-06-19 18:41:17	1995-06-19 18:46:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO204T	NGC224-NUC	00 42 46.912	+41 16 15.94	49	1995-06-19 18:52:17	1995-06-19 18:57:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO205T	NGC224-NUC	00 42 46.909	+41 16 15.93	49	1995-06-19 19:46:17	1995-06-19 19:51:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO206T	NGC224-NUC	00 42 46.910	+41 16 15.95	49	1995-06-19 19:57:17	1995-06-19 20:02:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO207T	NGC224-NUC	00 42 46.911	+41 16 15.92	49	1995-06-19 20:08:17	1995-06-19 20:13:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO208T	NGC224-NUC	00 42 46.912	+41 16 15.94	49	1995-06-19 20:19:17	1995-06-19 20:24:17	300.000	WFPC2	PC1	F
<input type="checkbox"/>	U2LGO209T	NGC224-NUC	00 42 46.909	+41 16 15.93	49	1995-06-19 21:23:17	1995-06-19 21:31:17	500.000	WFPC2	PC1	F

Data Archives

Enriching the collection - Article Graphics

The screenshot shows the ADSbeta website interface. The search bar at the top contains the query "author: Peng, C" and the search results are displayed in a grid format. The grid contains 12 thumbnails of article graphics, labeled Figure 9 through Figure 18. The thumbnails show various astronomical images and plots. On the right side of the grid, there is a sidebar with links to "FULL TEXT SOURCES" (Publisher PDF, Publisher Article, arXiv e-print), "DATA PRODUCTS" (NED objects, SIMBAD objects, Archival Data), and "SUGGESTED ARTICLES". A large blue arrow points from the "Thumbnail View Figures" text to the grid of figure thumbnails.

adssbeta

Feedback ORCID Learn Sign Up Log In

QUICK FIELD: Author First Author Abstract Year Fulltext All Search Terms

Advanced author:"^Peng, C" year:2002 bibstem:"AJ"

VIEW

- Abstract
- Citations (1311)
- References (80)
- Co-Reads
- Graphics
- Metrics

EXPORT

- In BibTeX
- In AASTeX
- In EndNote

Graphics from
Detailed Structural Decomposition of Galaxy Images

Every image links to the AAS "Astronomy Image Explorer" for more detail.

Figure 18

Figure 9

Figure 12

Figure 13

Figure 10

Figure 11

Figure 16

Figure 17

Figure 14

FULL TEXT SOURCES

- Publisher PDF
- Publisher Article
- arXiv e-print

DATA PRODUCTS

- NED objects (1)
- SIMBAD objects (1)
- Archival Data (2)

GRAPHICS

CLICK to view more

SUGGESTED ARTICLES

Early-Type Galaxies in the Sloan Digital Sky Survey. I. The Sample (Bernard, +)

more

Thumbnail View Figures

Enriching the collection - Citation Network

Citations/References



The screenshot shows the adsbeta website interface. At the top, there's a navigation bar with 'adsbeta' logo, 'Feedback', 'ORCID', 'Learn', 'Sign Up', and 'Log In'. Below this is a search bar with a 'QUICK FIELD' dropdown and a search button. The search results show a list of items: 'Abstract', 'Citations (1311)', and 'References (80)'. The 'Citations (1311)' item is highlighted with a blue box. To the left of the main content area, there's a sidebar with various options: 'VIEW', 'Abstract', 'Citations (1311)', 'References (80)', 'Co-Reads', 'Graphics', 'Metrics', 'EXPORT', 'in BibTeX', 'in AASTeX', and 'in EndNote'. The main content area displays the title 'Detailed Structural Decomposition of Galaxy Images' by Peng, Chien Y.; Ho, Luis C.; Impey, Chris D.; Rix, Hans-Walter. The abstract text is visible, starting with 'We present a two-dimensional fitting algorithm (GALFIT) designed to extract structural components from galaxy images...'. To the right of the abstract, there are sections for 'FULL TEXT SOURCES' (Publisher PDF, Publisher Article, arXiv e-print), 'DATA PRODUCTS' (NED objects, SIMBAD objects, Archival Data), 'GRAPHICS' (with a thumbnail image), and 'SUGGESTED ARTICLES' (Early-Type Galaxies in the Sloan Digital Sky Survey).

adsbeta

Feedback ORCID Learn Sign Up Log In

QUICK FIELD: Author First Author Abstract Year Fulltext All Search Terms

Advanced author:"^Peng, C" year:2002 bibstem:"AJ"

Back to results

VIEW

Abstract

Citations (1311)

References (80)

Co-Reads

Graphics

Metrics

EXPORT

in BibTeX

in AASTeX

in EndNote

Detailed Structural Decomposition of Galaxy Images

Show affiliations

Peng, Chien Y.; Ho, Luis C.; Impey, Chris D.; Rix, Hans-Walter

We present a two-dimensional fitting algorithm (GALFIT) designed to extract structural components from galaxy images, with emphasis on closely modeling light profiles of spatially well-resolved, nearby galaxies observed with the Hubble Space Telescope. Our algorithm improves on previous techniques in two areas: by being able to simultaneously fit a galaxy with an arbitrary number of components and with optimization in computation speed, suited for working on large galaxy images. We use two-dimensional models such as the "Nuker" law, the Sérsic (de Vaucouleurs) profile, an exponential disk, and Gaussian or Moffat functions. The azimuthal shapes are generalized ellipses that can fit disk and box components. Some potential applications of our program include: standard modeling of global galaxy profiles; extracting bars, stellar disks, double nuclei, and compact nuclear sources; and measuring absolute dust extinction or surface brightness fluctuations after removing the galaxy model. When examined in detail, we find that even simple looking galaxies generally require at least three components to be modeled accurately, rather than the one or two components more often employed. Many galaxies with complex isophotes, ellipticity changes, and position angle twists can be modeled accurately in two dimensions. We illustrate this by way of 11 case studies, which include regular and barred spiral galaxies, highly disk lenticular galaxies, and elliptical galaxies displaying various levels of complexities. A useful extension of this algorithm is to accurately extract nuclear point sources in galaxies. We compare two-dimensional and one-dimensional extraction techniques on simulated images of galaxies having nuclear slopes with different degrees of cuspsiness, and we then illustrate the application of the program to several examples of nearby galaxies with weak nuclei. Based on observations with the NASA/ESA Hubble Space Telescope, obtained at the Space Telescope Science Institute, which is operated by the Association of Universities for Research in Astronomy (AURA), Inc., under NASA contract NAS 5-26555.

Publication The Astronomical Journal, Volume 124, Issue 1, pp. 266-293.

Pub Date: July 2002

DOI: 10.1086/340952

Bibcode 2002AJ....124.266P

Keywords Galaxies: Bulges; Galaxies: Fundamental Parameters; Galaxies: Nuclei; Galaxies: Structure; Techniques: Image Processing; Techniques: Photometric; Astrophysics

FULL TEXT SOURCES

Publisher PDF

Publisher Article

arXiv e-print

DATA PRODUCTS

NED objects (1)

SIMBAD objects (1)

Archival Data (2)

GRAPHICS

Click to view more

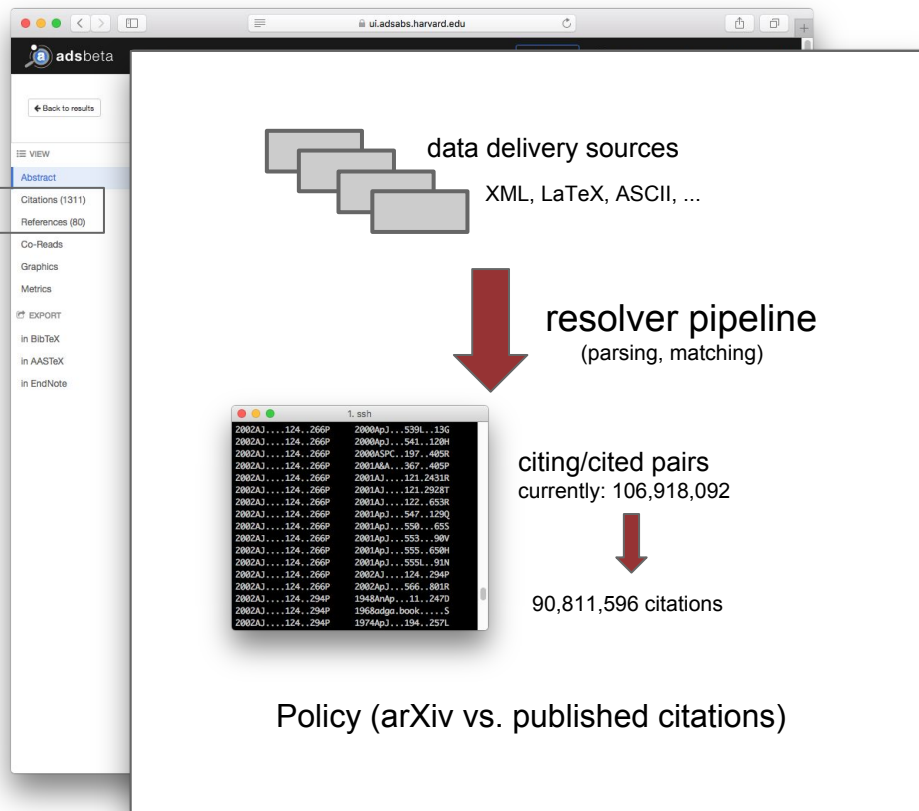
SUGGESTED ARTICLES

Early-Type Galaxies in the Sloan Digital Sky Survey. I. The Sample (Bernard, +)

more

Enriching the collection - Citation Network

Citations/References



Enriching the collection - Citation Network

Citations/References



adsbeta

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QUICK FIELD: Author First Author Abstract Year Fulltext All Search Terms

Advanced author:"Peng, C" year:2002 bibstem:"AJ"

VIEW

- Abstract
- Citations (1311)**
- References (80)
- Co-Reads
- Graphics
- Metrics
- EXPORT
- in BibTeX
- in AASTeX
- in EndNote

Papers which cite

Detailed Structural Decomposition of Galaxy Images

view this list in a search results page

- 2017MNRAS.465.3134L 2017/03
Dark-ages reionization and galaxy-formation simulation - VII. The sizes of high-redshift galaxies
Liu, Chuanwu; Mutch, Simon J.; Poole, Gregory B. and 5 more
- 2017MNRAS.465.2717P 2017/03
The structural and size evolution of star-forming galaxies over the last 11 Gyr
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- 2017MNRAS.465.4634D 2017/03
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K. Rubin; Das, M.; Kharb, P. and 1 more
- 2017MNRAS.465.619B 2017/02
The relationship between star formation activity and galaxy structural properties in CANDELS and a semi-analytic model
Brennan, Ryan; Pandya, Viraj; Somerville, Rachel S. and 13 more
- 2017MNRAS.465.2317J 2017/02
SDSS-IV MaNGA: bulge-disc decomposition of IFU data cubes (BUDDI)
Johnston, Evelyn J.; Häußler, Boris; Aragón-Salamancas, Alfonso and 12 more
- 2017MNRAS.465.2411M 2017/02
A new quadruple gravitational lens from the Hyper Suprime-Cam Survey: the puzzle of HSC J115252+004733
More, Anupreeta; Lee, Chien-Hsiu; Oguri, Masamune and 16 more
- 2017MNRAS.464.4176W 2017/02
Galaxy Zoo: morphological classifications for 120 000 galaxies in HST legacy imaging
Willett, Kyle W.; Galloway, Melanie A.; Bamford, Steven P. and 18 more
- 2017MNRAS.465.1157R 2017/02
Morpho-Kinematics of $z \sim 1$ galaxies probe the hierarchical scenario
Rodrigues, M.; Hammer, F.; Flores, H. and 2 more
- 2017ApJ...834...18B 2017/01
MOSFIRE Spectroscopy of Quiescent Galaxies at 1.5 z (2.5. I. Evolution of Structural and Dynamical Properties
Belli, Sirio; Newman, Andrew B.; Ellis, Richard S.
- 2017ApJ...834...30F 2017/01
Gemini Near Infrared Field Spectrograph Observations of the Seyfert 2 Galaxy

FULL TEXT SOURCES

- Publisher PDF
- Publisher Article
- arXiv e-print

DATA PRODUCTS

- NED objects (1)
- SIMBAD objects (1)
- Archival Data (2)

GRAPHICS

Click to view more

SUGGESTED ARTICLES

- Early-Type Galaxies in the Sloan Digital Sky Survey. I. The Sample (Bernard, +);

more

Enriching the collection - Usage Data (“Co-Reads”)

Co-Reads (ADS/arXiv)

adsbeta

Feedback ORCID Learn Sign Up Log In

QUICK FIELD: Author First Author Abstract Year Fulltext All Search Terms

Advanced author:"^Peng, C" year:2002 bibstem:"AJ"

VIEW

- Abstract
- Citations (1311)
- References (80)
- Co-Reads**
- Graphics
- Metrics
- EXPORT
- In BibTeX
- In AASTeX
- In EndNote

Papers also read by those who read
Detailed Structural Decomposition of Galaxy Images

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Young, Bing-Lin
- 2017NewA...52...89H 2017/04
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Hu, Wen; Dai, Ben-Zhong; Zeng, Wei and 2 more
- 2017NewA...52...95C 2017/04
V850 Cyg: An eclipsing binary with a giant γ Dor pulsator
Çakır, Ö.; İbanoglu, C.; Sipahi, E. and 1 more
- 2017MNRAS.465.3134L 2017/03
Dark-ages reionization and galaxy-formation simulation - VII. The sizes of high-redshift galaxies
Liu, Chuanwu; Mutch, Simon J.; Poole, Gregory B. and 5 more
- 2017MNRAS.465.3203M 2017/03
The GAIAH survey: observational overview and Gaia DR1 companion
Martell, S. L.; Sharma, S.; Butler, S. and 31 more
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- 2017MNRAS.465.3803V 2017/03
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Hiding in plain sight — recovering clusters of galaxies with the strongest AGN in their cores
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A large H α survey of star formation in relaxed and merging galaxy cluster environments at $z \sim 0.15-0.3$
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- 2017MNRAS.466...1D 2017/03
NIHAO - XI. Formation of ultra-diffuse galaxies by outflows
Di Cintio, Arianna; Brook, Chris B.; Dutton, Anne A. and 3 more

FULL TEXT SOURCES

- Publisher PDF
- Publisher Article
- arXiv e-print

DATA PRODUCTS

- NED objects (1)
- SIMBAD objects (1)
- Archival Data (2)

GRAPHICS

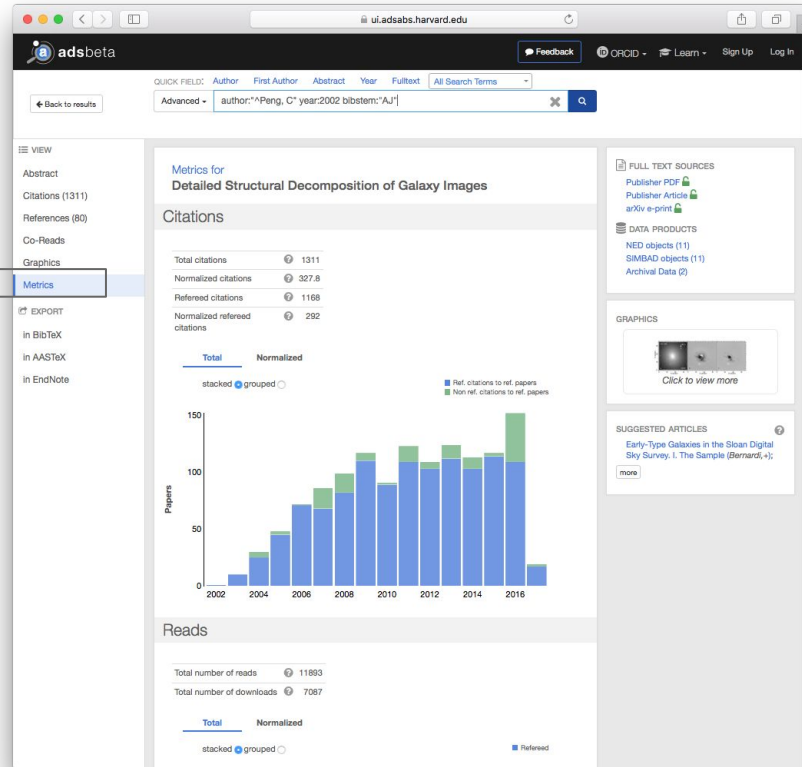
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SUGGESTED ARTICLES

Early-Type Galaxies in the Sloan Digital Sky Survey. I. The Sample (Bernard, +); more

Enriching the collection - Basic Metrics (usage, citations)

Basic Metrics



Enriching the collection - Associated Information

- Errata
- Addenda
- Series
- arXiv matches
- ...

The screenshot shows the ADS website interface. At the top, the URL is ui.adsabs.harvard.edu. The search bar contains the query "author:~Peng, C* year:2002 bibstem:AJ". The left sidebar shows the "Abstract" tab selected, with other options like "Citations (1311)", "References (80)", "Co-Reads", "Graphics", "Metrics", and "EXPORT". The main content area displays the article title "Detailed Structural Decomposition of Galaxy Images" and the authors "Peng, Chien Y.; Ho, Luis C.; Impey, Chris D.; Rix, Hans-Walter". The abstract text describes a two-dimensional fitting algorithm (GALFIT) for galaxy images. The right sidebar contains sections for "FULL TEXT SOURCES" (Publisher PDF, Publisher Article, arXiv e-print), "DATA PRODUCTS" (NED objects, SIMBAD objects, Archival Data), "GRAPHICS" (a small image of a galaxy), and "SUGGESTED ARTICLES" (Early-Type Galaxies in the Sloan Digital Sky Survey).

Abstract

[Show affiliations](#)

Peng, Chien Y.; Ho, Luis C.; Impey, Chris D.; Rix, Hans-Walter

We present a two-dimensional fitting algorithm (GALFIT) designed to extract structural components from galaxy images, with emphasis on closely modeling light profiles of spatially well-resolved, nearby galaxies observed with the Hubble Space Telescope. Our algorithm improves on previous techniques in two areas: by being able to simultaneously fit a galaxy with an arbitrary number of components and with optimization in computation speed, suited for working on large galaxy images. We use two-dimensional models such as the "Nuker" law, the Sérsic (de Vaucouleurs) profile, an exponential disk, and Gaussian or Moffat functions. The azimuthal shapes are generalized ellipses that can fit disk and box components. Some potential applications of our program include: standard modeling of global galaxy profiles; extracting bars, stellar disks, double nuclei, and compact nuclear sources; and measuring absolute dust extinction or surface brightness fluctuations after removing the galaxy model. When examined in detail, we find that even simple looking galaxies generally require at least three components to be modeled accurately, rather than the one or two components more often employed. Many galaxies with complex isophotes, ellipticity changes, and position angle twists can be modeled accurately in two dimensions. We illustrate this by way of 11 case studies, which include regular and barred spiral galaxies, highly disk lenticular galaxies, and elliptical galaxies displaying various levels of complexities. A useful extension of this algorithm is to accurately extract nuclear point sources in galaxies. We compare two-dimensional and one-dimensional extraction techniques on simulated images of galaxies having nuclear slopes with different degrees of cuspsiness, and we then illustrate the application of the program to several examples of nearby galaxies with weak nuclei. Based on observations with the NASA/ESA Hubble Space Telescope, obtained at the Space Telescope Science Institute, which is operated by the Association of Universities for Research in Astronomy (AURA), Inc., under NASA contract NAS 5-26555.

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Pub Date: July 2002

DOI: 10.1086/340952

Bibcode 2002AJ....124..266P

Keywords Galaxies: Bulges; Galaxies: Fundamental Parameters; Galaxies: Nuclei; Galaxies: Structure; Techniques: Image Processing; Techniques: Photometric; Astrophysics

ETL: Extract, Transform And Load

Data Ingest To Production Servers

Ingest: Extract, Transform, Load

Bibliographic

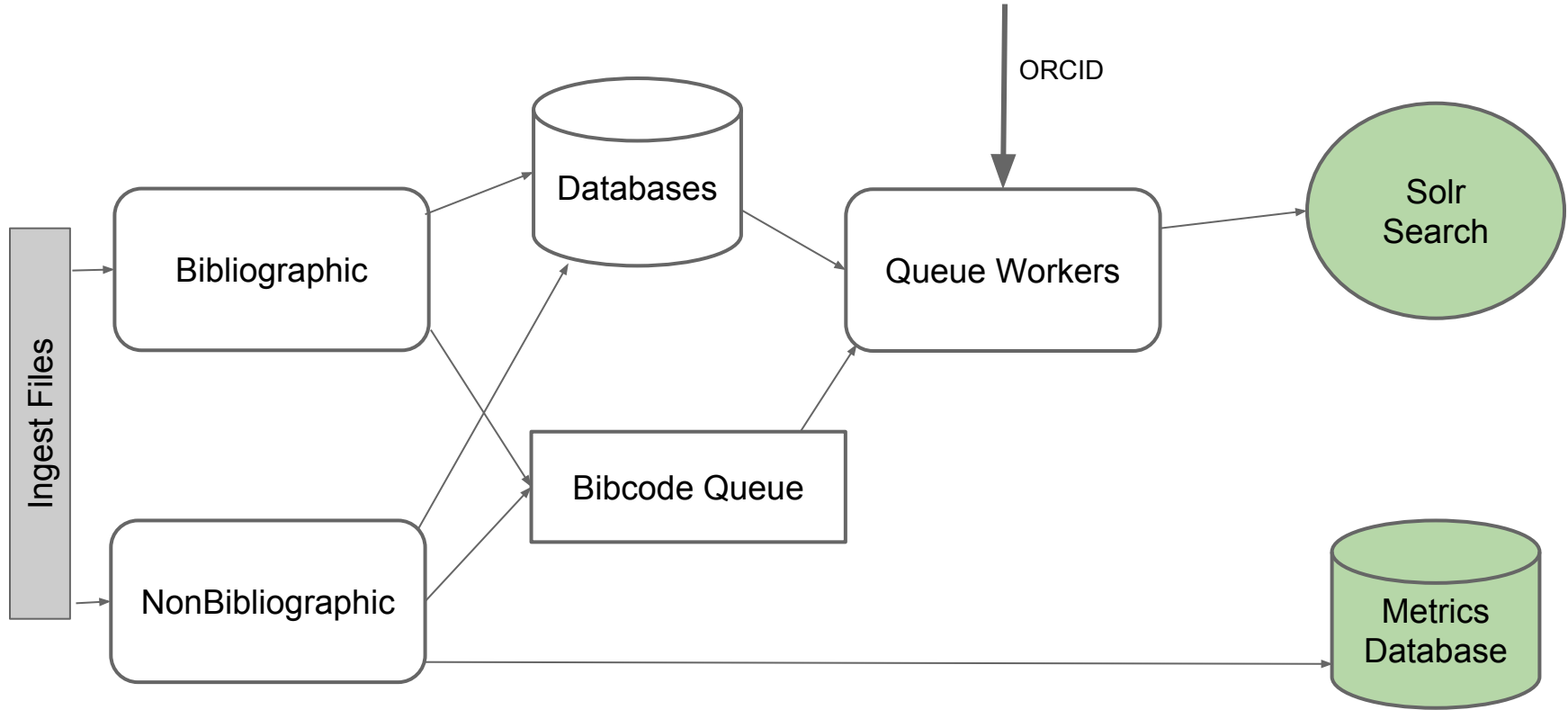
- From Publishers
- Variety Of Formats

Non-Bibliographic

- Refereed Status, Read Counts, Citation Network
- Bibliographic Groups, Data Links, SIMBAD Objects
- arXiv.org, ADS Usage

	Classic	Bumblebee
Source Content	Metadata,References,Abstract(bib) ASCII tables (nonbib)	Metadata, References, Full-text ADS Classic indexes (nonbib)
Back-end	Flat files, ASCII tables	SQL and MongoDB
Index	Author, Title, Abstract, Keywords; 30 GB in size	~50 fields including full-text, affiliations, ORCIDs ; 400 GB in size
Code	300K lines of home-grown C / PERL code, single threaded	Open source stack: SOLR, SQL, RabbitMQ, Docker containers
Performance	48 hours required to reindex all data, 12 hours to mirror	3 hours to Metrics, 48 to Solr
Features	Custom tagged files format, ASCII index, limited phrase search	API, phrase and positional search, facets, scalable metrics, citations

Improved Ingest Pipeline



Improving Ingest

Performance: MongoDB To Postgres

Reliability: Single Threaded

Deployability: Reuse Bumblebee Microservice Framework

Visibility: Manage With Airflow

Airflow

Airflow - DAGs

localhost:8080/admin/

Airflow DAGs Data Profiling Browse Admin Docs 12:33 UTC

DAGs

Show 6 entries Search:

	DAG	Schedule	Owner	Recent Statuses	Links
Off	BumblebeeETL	03***	airflow	○ ○ ○ ○ ○ ○	🔍 📊 🗓️ ⚙️ 🔌 🔍
On	BumblebeeETLingestAndMetrics	08***	airflow	○ ○ ○ ○ ○ ○	🔍 📊 🗓️ ⚙️ 🔌 🔍
Off	BumblebeeETLOnce	@once	airflow	③ ○ ○ ○ ○ ○ ○	🔍 📊 🗓️ ⚙️ 🔌 🔍
On	FindMissingBibcodes	011***	airflow	○ ○ ○ ○ ○ ○	🔍 📊 🗓️ ⚙️ 🔌 🔍
Off	Test	@once	airflow	○ ○ ○ ○ ○ ○	🔍 📊 🗓️ ⚙️ 🔌 🔍
Off	ValidateMetrics	011***	airflow	○ ○ ① ○ ○ ○ ○	🔍 📊 🗓️ ⚙️ 🔌 🔍

Showing 1 to 6 of 6 entries

Previous 1 Next

DAG: BumblebeeETLDag

Graph View

Tree View

Task Duration

Landing Times

Gantt

Details

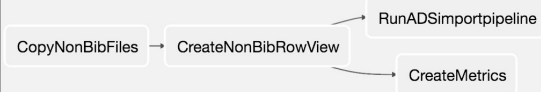
Code

Run: manual_2016-12-02T19:49:02.840115

Layout: Left->Right

Go

BashOperator



Graph View

Tree View

Task Duration

Landing Times

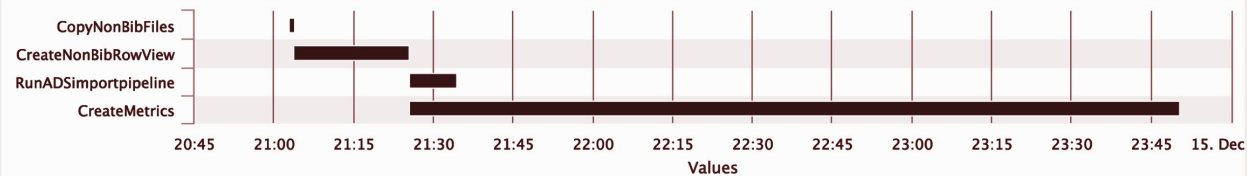
Gantt

Details

Code

Run: 2016-12-14 21:03:07

Go



Highcharts.com

Thank you!
Q&A

Overview

- Extraction / Transform / Load
 - Content being indexed
 - Technology stack: ADS Classic vs. new architecture
 - Pipeline details