Astrophysics Seminar 2012 Fall

- **To Read**
  journal papers, news, …, anything
- **To Present**
  how to show (what you want to show) by a talk? By a poster?
- **To Listen**
  how to be an audience
- **To Write**
  term papers, conference proceedings
  journal papers

Homework Assignment

- Do a survey, as comprehensive as possible, of journals that publish astronomy- or astrophysics-related research results. Which of them have associated publications, e.g., letters or supplements?
- How often does each journal publish?
  In what language?
  (By what publisher?)
  (Do we subscribe to it?) …
- How does the ‘style’ of each journal differ from each other? Note the title, abstract, references.
- Zoom in to one particular ‘**core**’ journal and browse through one recent paper in it. Do the same for one off-core journal.
- What is the ***Science Citation Index***? What is the ***Impact Factor***? What is the ***Open Access*** policy?

How to do a presentation …

Why? What? To whom? When? Where?

- Be prepared (to show only 10% of what you know/prepare)
- Be confident
- Practice efficient language
- Use proper media (overhead, slides, PowerPoint; words only, blackboard …)
- Write legibly (text & graphics)

How to do a presentation …

Why? What? To whom? When? Where?

- Be prepared (to show only 10% of what you know/prepare)
- Be confident
- Practice efficient language
- Use proper media (overhead, slides, PowerPoint; words only, blackboard …)
- Write legibly (text & graphics)

How to do a presentation …

Why? What? To whom? When? Where?

- Be prepared (to show only 10% of what you know/prepare)
- Be confident
- Practice efficient language
- Use proper media (overhead, slides, PowerPoint; words only, blackboard …)

- Write legibly (text & graphics)

How to do a presentation …

Why? What? To whom? When? Where?

- Be prepared

  ready to show only 10% of what you know/prepare

- Be confident
- Practice efficient language
- Use proper media

  overhead, slides, PowerPoint; words only, blackboard …

- Write legibly (text & graphics)

How to do a presentation (*cont*.)

- Exercise gestures/body language (walk around sometimes)
- Do **NOT** block the screen
- Stick to the time limit
- Pay attention to your audience
- Sprinkle a touch of humor (yes, only a touch!)

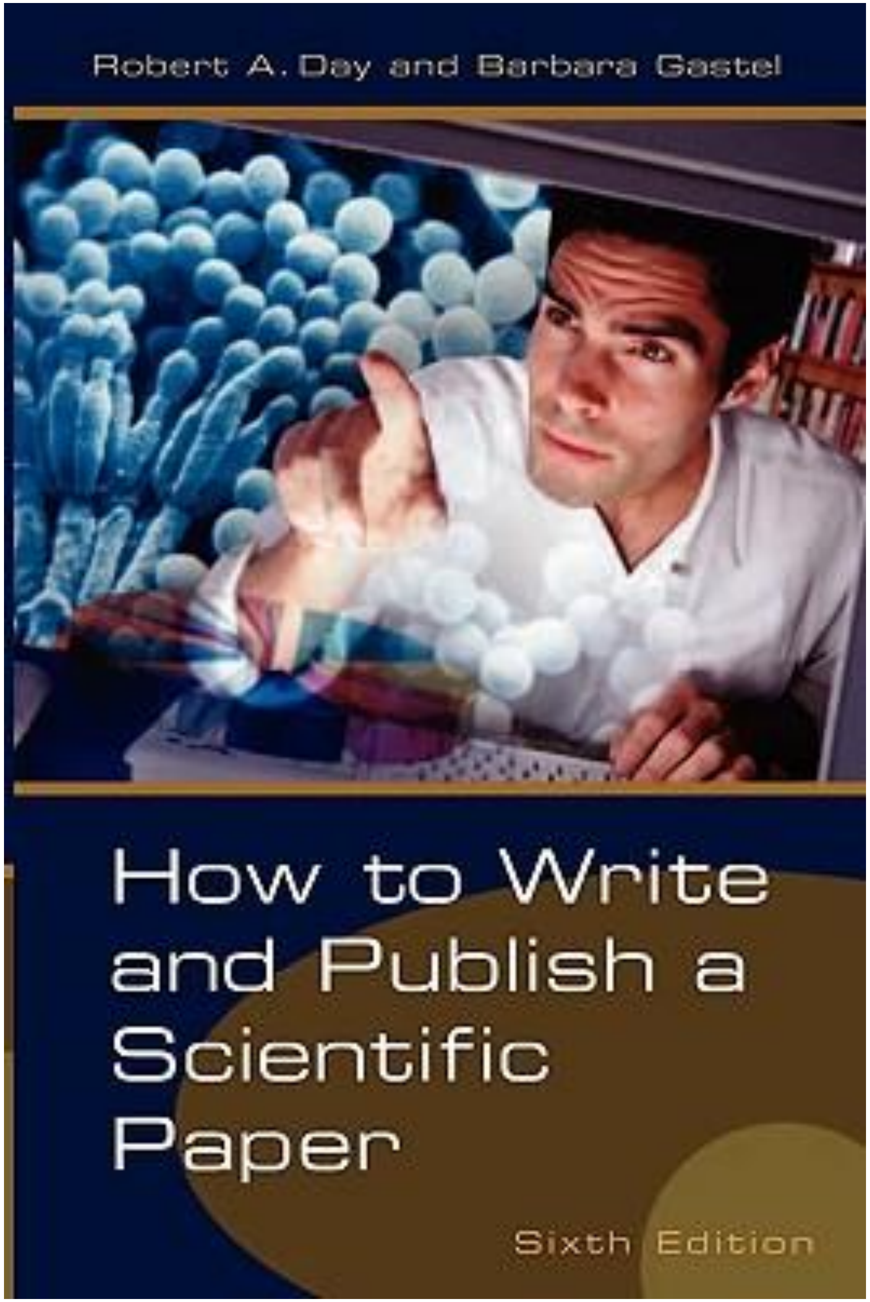
How to be an audience?

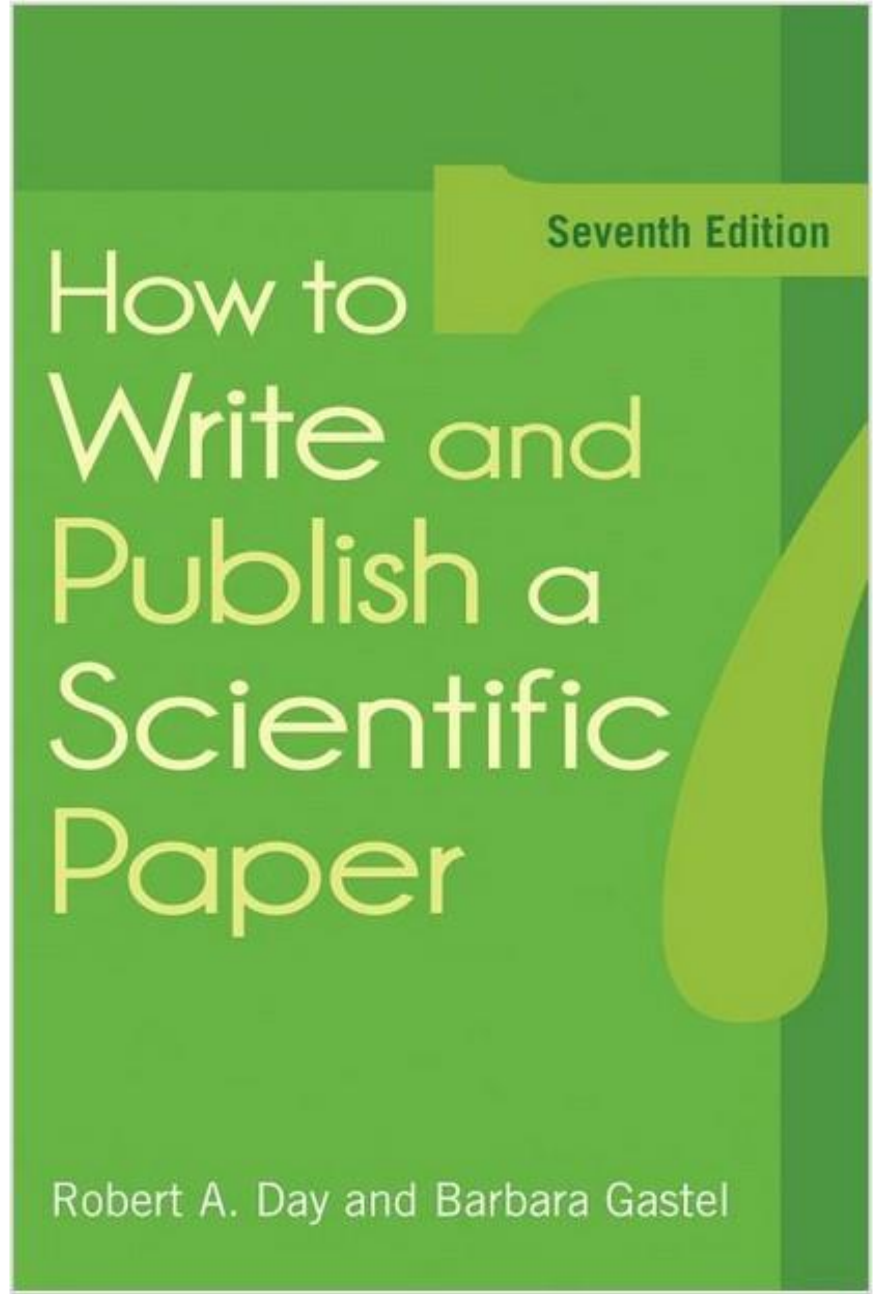
- Homework/preview work
- Learn a thing or/then two
- Do **NOT** chat with others
- Ask questions
- …

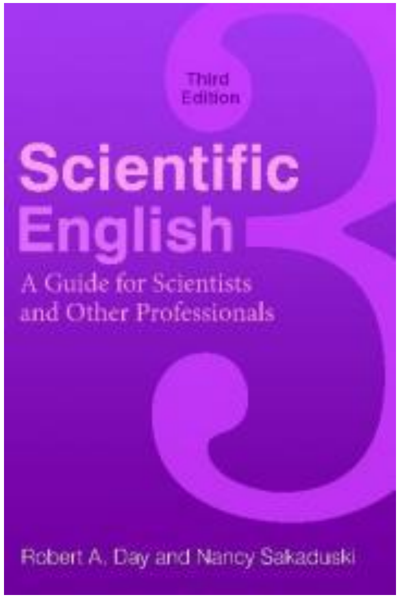
Publication of a Journal Paper

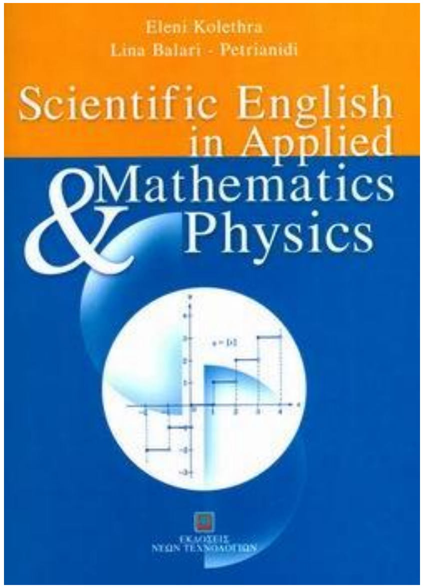
- Original research results
- Nature of the paper? Targeted readership?
- Leading astronomy/astrophysics journals
  - *Astrophysical Journal (ApJ)*
  - *Astronomical Journal (AJ)*
  - *Astronomy & Astrophysics (A&A)*
  - *Monthly Notices of the Royal Astronomical Society (MNRAS)*
  - *Publication of the Astronomical Society of the Pacific (PASP)*
  - *Icarus*
  - *PASJ, PASA, JAA…*

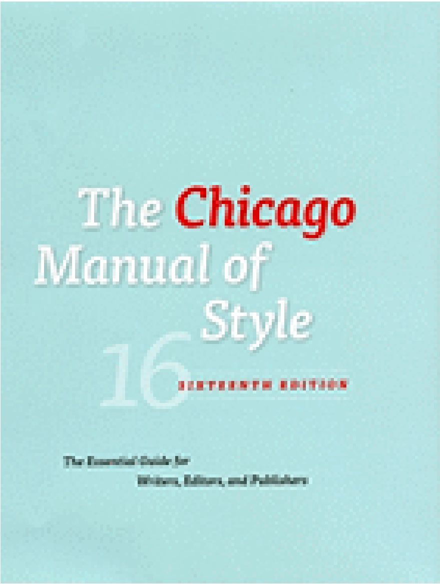
- What about *Nature*, *Science*, *Ann Rev Astron & Astrophy*?
- Name 1-2 recently established journals not listed above.
- Write in a clear and concise way; select a personal "model" paper.

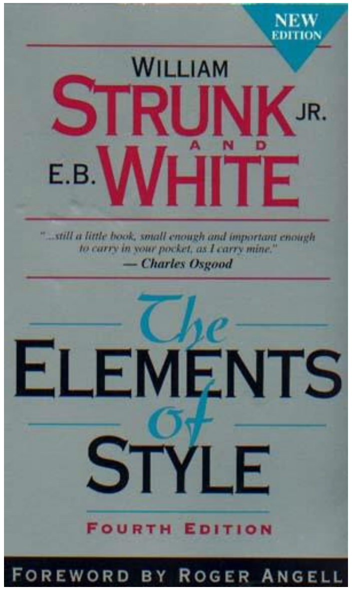

Robert A. Day and Barbara Gastel
How to Write and Publish a Scientific Paper
Sixth Edition


Seventh Edition
How to Write and Publish a Scientific Paper
Robert A. Day and Barbara Gastel









Common English mistakes made by native Chinese speakers
by Philip Guo

天文物理類英文科技論文寫作的常見問題 張雙南、許云

Evolution of a manuscript
– An example

- the draft
- a revised version
- the final submitted version

Publication of a Journal Paper

- Typesetting the manuscript
  - Latex vs Word or other word processors
  - Text, figures, and tables
- Peer review by referee(s)
- Preprint and astro-ph submissions
- Galley proofs
- … in preparation; in submission; in press
  … private communications

A sample Latex file

```
\documentclass[12pt,preprint]{aastex}

\usepackage{graphicx}                    \usepackage{natbib}

\slugcomment{To be submitted to AJ; today is \today}

\begin{document}

\title{Typesetting by Latex for Graduate Seminar Course }
\author{ W. P. Chen\altaffilmark{1}   }

\altaffiltext{1}{Institute of Astronomy, National Central University, Jhongli 32001, Taiwan}
%
\begin{abstract}
%
 This is a sample                         Latex file, to see how professional typesetting is done.
 %
 \end{abstract}

 \section{Introduction}

 So this is how it works.

  The original file includes some ``commands'', but the contents are in ASCII.  Latex is
   particularly convenient to effectively produce Greek letters, $\alpha, \beta, \Omega$, and
    math $\int_0^{100} \sin\omega d\omega$.

 \end{document}
```

Output of the Latex file

To be submitted to AJ; today is March 9, 2011

Typesetting by Latex for Graduate Seminar Course

W. P. Chen[1]

ABSTRACT

This is a sample Latex file, to see how professional typesetting is done.

1. Introduction

So this is how it works.

The original file includes some "commands", but the contents are in ASCII. Latex is particularly convenient to effectively produce Greek letters, α, β, Ω, and math $\int_0^{100} \sin \omega d\omega$.

[1]Institute of Astronomy, National Central University, Jhongli 32001, Taiwan

Reference Styles

Nature

1. Whipple, F. L. Origin of the comets. *Proc. Natl Acad. Sci. USA* **51,** 711–715 (1964).
2. Mumma, M. I., Weissman, P. R. & Stern, S. A. in *Protostars and Planets III* (eds Levy, E. H., Lunine, J. I. & Matthews, M. S.) 1177–1252 (Univ. Arizona Press, Tucson, 1993).
3. Whipple, F. L. A comet model I: The acceleration of comet Encke. *Astrophys. J.* **111,** 375–394 (1950).

Astrophysical Journal

Beech, M., & Mitalas, R. 1994, ApJS, 95, 517
Chlebowski, T., & Garmany, C. D. 1991, ApJ, 368, 241
Conti, P. S., Garmany, C. D, deLoore, C., & Vanbeveren, D. 1983, ApJ, 274, 302

Annual Review of Astronomy and Astrophysics

Adams, JD, Stauffer, JR, Monet, DG, Skrutskie, MF & Beichman, CA. 2001, *Ap.J.*, 121:2053-2064

Allen, C & Poveda, A. 1974, in *The Stability of the Solar System and of Small Stellar Systems*, ed. Y. Kozai, pp. 239-246. Dodrecht: Kluwer.

A sample ApJ paper heading …

Digital Object Identifier

The Astrophysical Journal, 730:139 (14pp), 2011 April 1 doi:10.1088/0004-637X/730/2/139

GEOMETRIC AND DYNAMICAL MODELS OF REVERBERATION MAPPING DATA

Anna Pancoast, Brendon J. Brewer, and Tommaso Treu[1]
Department of Physics, University of California, Santa Barbara, CA 93106-9530, USA; pancoast@physics.ucsb.edu

Received 2010 December 13; accepted 2011 January 27; published 2011 March 15

ABSTRACT

We present a general method to analyze reverberation (or echo) mapping data that simultaneously provides estimates for the black hole mass and for the geometry and dynamics of the broad-line region (BLR) in active galactic nuclei (AGNs). While previous methods yield a typical scale size of the BLR or a reconstruction of the transfer function, our method directly infers the spatial and velocity distribution of the BLR from the data, from which a transfer function can be easily derived. Previous echo mapping analysis requires an independent estimate of a scaling factor known as the virial coefficient to infer the mass of the black hole, but this is not needed in our more direct approach. We use the formalism of Bayesian probability theory and implement a Markov Chain Monte Carlo algorithm to obtain estimates and uncertainties for the parameters of our BLR models. Fitting of models to the data requires knowledge of the continuum flux at all times, not just the measured times. We use Gaussian Processes to interpolate and extrapolate the continuum light curve data in a fully consistent probabilistic manner, taking the associated errors into account. We illustrate our method using simple models of BLR geometry and dynamics and show that we can recover the parameter values of our test systems with realistic uncertainties that depend upon the variability of the AGN and the quality of the reverberation mapping observing campaign. With a geometry model we can recover the mean radius of the BLR to within ~ 0.1 dex random uncertainty for simulated data with an integrated line flux uncertainty of 1.5%, while with a dynamical model we can recover the black hole mass and the mean radius to within ~ 0.05 dex random uncertainty, for simulated data with a line profile average signal-to-noise ratio of 4 per spectral pixel. These uncertainties do not include modeling errors, which are likely to be present in the analysis of real data, and should therefore be considered as lower limits to the accuracy of the method.

Key words: galaxies: active – methods: data analysis – methods: statistical

Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY

Mon. Not. R. Astron. Soc. **412,** 13–25 (2011) doi:10.1111/j.1365-2966.2010.17818.x

Protoplanetary disc evolution and dispersal: the implications of X-ray photoevaporation

James E. Owen,[1★] Barbara Ercolano[2] and Cathie J. Clarke[1]

[1] *Institute of Astronomy, Madingley Road, Cambridge CB3 0HA*
[2] *School of Physics, University of Exeter, Stocker Road, Exeter EX4 4QL*

Accepted 2010 October 2. Received 2010 October 2; in original form 2010 August 6

ABSTRACT

We explore the role of X-ray photoevaporation in the evolution and dispersal of viscously evolving T Tauri discs. We show that the X-ray photoevaporation wind rates scale linearly with X-ray luminosity, such that the observed range of X-ray luminosities for solar-type T Tauri stars (10^{28}–10^{31} erg s^{-1}) gives rise to vigorous disc winds with rates of the order of 10^{-10} to 10^{-7} M$_{\odot}$ yr^{-1}. These mass-loss rates are comparable to typically observed T Tauri accretion rates, immediately demonstrating the relevance of X-ray photoevaporation to disc evolution. We use the wind solutions from radiation-hydrodynamic models, coupled to a viscous evolution model, to construct a population synthesis model so that we may study the physical properties of evolving discs and so-called 'transition discs'. Current observations of disc lifetimes and accretion rates can be matched by our model assuming a viscosity parameter $\alpha = 2.5 \times 10^{-3}$.

Our models confirm that X-rays play a dominant role in the evolution and dispersal of protoplanetary discs giving rise to the observed diverse population of inner-hole 'transition' sources which include those with massive outer discs, those with gas in their inner holes and those with detectable accretion signatures. To help understand the nature of observed transition discs we present a diagnostic diagram based on accretion rates versus inner-hole sizes that demonstrate that, contrary to recent claims, many of the observed accreting and non-accreting transition discs can easily be explained by X-ray photoevaporation. However, we draw attention to a smaller but still significant population of strongly accreting ($\sim 10^{-8}$ M$_{\odot}$ yr^{-1}) transition discs with large inner holes ($>$20 au) that lie outside the predicted X-ray photoevaporation region, suggesting a different origin for their inner holes.

Finally, we confirm the conjecture of Drake et al. that accretion is suppressed by the X-rays through 'photoevaporation-starved accretion' and predict that this effect can give rise to a negative correlation between X-ray luminosity and accretion rate, as reported in the Orion data. We also demonstrate that our model can replicate the observed difference in X-ray properties between accreting and non-accreting T Tauri stars.

Key words: accretion, accretion discs – protoplanetary discs – circumstellar matter – stars: pre-main-sequence – X-rays: stars.

ABSTRACT

Jump to…

We explore the role of X-ray photoevaporation in the evolution and dispersal of viscously evolving T Tauri discs. We show that the X-ray photoevaporation wind rates scale linearly with X-ray luminosity, such that the observed range of X-ray luminosities for solar-type T Tauri stars (10^{28}–10^{31} erg s^{-1}) gives rise to vigorous disc winds with rates of the order of 10^{-10} to 10^{-7} $M_\odot$ yr^{-1}. These mass-loss rates are comparable to typically observed T Tauri accretion rates, immediately demonstrating the relevance of X-ray photoevaporation to disc evolution. We use the wind solutions from radiation-hydrodynamic models, coupled to a viscous evolution model, to construct a population synthesis model so that we may study the physical properties of evolving discs and so-called 'transition discs'. Current observations of disc lifetimes and accretion rates can be matched by our model assuming a viscosity parameter $\alpha = 2.5 \times 10^{-3}$.

Our models confirm that X-rays play a dominant role in the evolution and dispersal of protoplanetary discs giving rise to the observed diverse population of inner-hole 'transition' sources which include those with massive outer discs, those with gas in their inner holes and those with detectable accretion signatures. To help understand the nature of observed transition discs we present a diagnostic diagram based on accretion rates versus inner-hole sizes that demonstrate that, contrary to recent claims, many of the observed accreting and non-accreting transition discs can easily be explained by X-ray photoevaporation. However, we draw attention to a smaller but still significant population of strongly accreting ($\sim 10^{-8}$ $M_\odot$ yr^{-1}) transition discs with large inner holes (>20 au) that lie outside the predicted X-ray photoevaporation region, suggesting a different origin for their inner holes.

Finally, we confirm the conjecture of Drake et al. that accretion is suppressed by the X-rays through 'photoevaporation-starved accretion' and predict that this effect can give rise to a negative correlation between X-ray luminosity and accretion rate, as reported in the Orion data. We also demonstrate that our model can replicate the observed difference in X-ray properties between accreting and non-accreting T Tauri stars.

REFERENCES

Jump to…

Albacete Colombo J. F., Flaccomio E., Micela G., Sciortino S., Damiani F., 2007, *A&A*, **464**, 211
CrossRef, Web of Science® Times Cited: 23

Alexander R. D., Armitage P. J., 2007, *MNRAS*, **375**, 500
Abstract | Full Article (HTML) | PDF(883K) | References

Alexander R. D., Armitage P. J., 2009, *ApJ*, **704**, 989
CrossRef, Web of Science® Times Cited: 3

Alexander R. D., Clarke C. J., Pringle J. E., 2004, *MNRAS*, **354**, 71
Abstract | Full Article (HTML) | PDF(435K) | References

Alexander R. D., Clarke C. J., Pringle J. E., 2006a, *MNRAS*, **369**, 216
Abstract | Full Article (HTML) | PDF(582K) | References

Alexander R. D., Clarke C. J., Pringle J. E., 2006b, *MNRAS*, **369**, 229
Abstract | Full Article (HTML) | PDF(601K) | References

Andrews S. M., Williams J. P., 2005, *ApJ*, **631**, 1134
CrossRef, ChemPort, Web of Science® Times Cited: 180

Andrews S. M., Wilner D. J., Hughes A. M., Qi C., Dullemond C. P., 2010, *ApJ*, **723**, 1241
CrossRef, ChemPort, Web of Science®

Armitage P. J., Hansen B. M. S., 1999, *Nat*, **402**, 633
CrossRef, ChemPort, Web of Science® Times Cited: 27

Armitage P. J., Clarke C. J., Palla F., 2003, *MNRAS*, **342**, 1139
Abstract | Full Article (HTML) | PDF(227K) | References

Asplund M., Grevesse N., Sauval A. J., 2005, in BarnesT. G., III, BashF. N., eds, ASP Conf. Ser. Vol. 336, *Cosmic Abundances as Records of Stellar Evolution and Nucleosynthesis in honor of David L. Lambert*. Astron. Soc. Pac., San Francisco , p. 25

A sample online HTML version

A sample A&A paper heading …

A&A 527, A97 (2011)
DOI: 10.1051/0004-6361/201015935

Astronomy & Astrophysics

A parsec-scale outflow from the luminous YSO IRAS 17527-2439

W. P. Varricatt

Joint Astronomy Centre, 660 N. Aohoku Pl., Hilo, HI-96720, USA
e-mail: w.varricatt@jach.hawaii.edu

Received 15 October 2010 / Accepted 17 December 2010

ABSTRACT

Aims. We seek to understand the way massive stars form. The case of a luminous YSO IRAS 17527-2439 is studied in the infrared.
Methods. Imaging observations of IRAS 17527-2439 are obtained in the near-IR *JHK* photometric bands and in a narrow-band filter centred at the wavelength of the H_2 1-0S(1) line. The continuum-subtracted H_2 image is used to identify outflows. The data obtained in this study are used in conjunction with *Spitzer*, AKARI, and IRAS data. The YSO driving the outflow is identified in the *Spitzer* images. The spectral energy distribution (SED) of the YSO is studied using available radiative transfer models.
Results. A parsec-scale bipolar outflow is discovered in our H_2 line image, which is supported by the detection in the archival *Spitzer* images. The H_2 image exhibits signs of precession of the main jet and shows tentative evidence for a second outflow. These suggest the possibility of a companion to the outflow source. There is a strong component of continuum emission in the direction of the outflow, which supports the idea that the outflow cavity provides a path for radiation to escape, thereby reducing the radiation pressure on the accreted matter. The bulk of the emission observed close to the outflow in the WFCAM and *Spitzer* bands is rotated counter clockwise with respect to the outflow traced in H_2, which may be due to precession. A model fit to the SED of the central source tells us that the YSO has a mass of 12.23 $M_\odot$ and that it is in an early stage of evolution.

Key words. stars: formation – stars: pre-main sequence – ISM: jets and outflows – stars: protostars – circumstellar matter

100% cut and paste

The same …

A&A 527, A97 (2011)
DOI: 10.1051/0004-6361/201015935

Astronomy & Astrophysics

A parsec-scale outflow from the luminous YSO IRAS 17527-2439

W. P. Varricatt

Joint Astronomy Centre, 660 N. Aohoku Pl., Hilo, HI-96720, USA
e-mail: w.varricatt@jach.hawaii.edu

Received 15 October 2010 / Accepted 17 December 2010

ABSTRACT

Aims. We seek to understand the way massive stars form. The case of a luminous YSO IRAS 17527-2439 is studied in the infrared.
Methods. Imaging observations of IRAS 17527-2439 are obtained in the near-IR *JHK* photometric bands and in a narrow-band filter centred at the wavelength of the H_2 1-0S(1) line. The continuum-subtracted H_2 image is used to identify outflows. The data obtained in this study are used in conjunction with *Spitzer*, AKARI, and IRAS data. The YSO driving the outflow is identified in the *Spitzer* images. The spectral energy distribution (SED) of the YSO is studied using available radiative transfer models.
Results. A parsec-scale bipolar outflow is discovered in our H_2 line image, which is supported by the detection in the archival *Spitzer* images. The H_2 image exhibits signs of precession of the main jet and shows tentative evidence for a second outflow. These suggest the possibility of a companion to the outflow source. There is a strong component of continuum emission in the direction of the outflow, which supports the idea that the outflow cavity provides a path for radiation to escape, thereby reducing the radiation pressure on the accreted matter. The bulk of the emission observed close to the outflow in the WFCAM and *Spitzer* bands is rotated counter clockwise with respect to the outflow traced in H_2, which may be due to precession. A model fit to the SED of the central source tells us that the YSO has a mass of 12.23 $M_\odot$ and that it is in an early stage of evolution.

Key words. stars: formation – stars: pre-main sequence – ISM: jets and outflows – stars: protostars – circumstellar matter

400% cut, paste, and shrink

Class Exercise --- A sample letter

Dear Takahashi-san

I am so concern about the devastations triggering by terrible earthquake and tsunami in Japan. Everyday, I read news and pray for the things will going well many times.
GAO is quite close to the Toyko. Are people and every things in GAO allright?

God Bless you and eveyone in GAO

- What does this letter try to say?
- What are the problems with it?

Let us try to improve it.

Mind the Pronunciation

Read out loud and listen to yourself

- mor<u>pho</u>logy ***vs*** morpho<u>lo</u>gical
- <u>mo</u>lecule ***vs*** mo<u>le</u>cular
- a<u>na</u>lysis ***vs*** <u>an</u>alyze/analyse
- s<u>pe</u>ctra ***vs*** spec<u>tro</u>scopy ***vs*** spectros<u>co</u>pic

Mind the Sentence Structure

- We would like to find out what the dark energy is.
- You may wonder “What is the dark energy?”

Wen-Ping Chen <wenpchen@gmail.com>

Question about the proceeding of APRIM2011

Po-Shih Chiang <pschiang@gmail.com> **2011年10月26日下午2:41**
收件者: ncs@narit.or.th, ncs_support@narit.or.th
副本: Wen-Ping Chen <wchen@astro.ncu.edu.tw>, IR lab <all@irlab.astro.ncu.edu.tw>

Dear Sir/Madam,

This is Poshih Chiang, a PhD student from Taiwan. I was trying to submit my article with the on-line system but got a problem.
In the 3rd step of the on-line submission system, the country shows "Taiwan, a Province of China" which is incorrect and is very confused.
This problem could be corrected by changed another country list. Would you please inform your IT team to replace a correct country list?
Thank you very much.

Sincerely,
Poshih Chiang

Gmail by Google

Wen-Ping Chen <wenpchen@gmail.com>

2nd Announcement - IAU APRIM2011, Chiang Mai, Thailand, 26-29 July, 2011

Wen-Ping Chen <wchen@astro.ncu.edu.tw> **2010年12月20日下午11:54**
收件者: "Dr. Busaba Kramer" <bkramer@mpifr-bonn.mpg.de>, boonrucksar@narit.or.th, Seline Hu <m989001@astro.ncu.edu.tw>

Dear Busaba

I just registered for the APRIM. Thanks for the efforts. The website is shaping up nicely.

I noticed for us from Taiwan, the selection for "Country" is "Taiwan, Province of China". I understand very well this is because of the particular set of database downloaded by the person who set up the webpage. But you can see this poses an embarrasing situation for us. I am not trying to solve the political dilemma, but do you think it is possible if the webmaster can simple choose a different database, for which Taiwan is just "Taiwan" (I've used many of such). Thanks.

Wen Ping

simply

Nicknames in English --- you should know these, but do not use them unless you know the person very well.

MALE	
Albert	Al
Andrew	Andy
Anthony	Tony
Arthur	Art, Arty
Bernard	Bernie, Bern
Charles	Charlie, Chuck
Christopher	Chris
Daniel	Dan, Danny
Donald	Don
Edward	Ed, Eddie
Eugene	Gene
Francis	Frank, Fran
Frederick	Fred, Freddy
Henry	Hank
Irving	Irv
James	Jim, Jimmy
Joseph	Joe
John	Jack, Jacky

Lawrence	Larry
Leonard	Leo
Nathan	Nat, Nate
Nicholas	Nick
Patrick	Pat
Peter	Pete
Raymond	Ray
Richard	Dick, Rick
Robert	Bob, Bobby, Rob
Ronald	Ron, Ronny
Russell	Russ
Samuel	Sam, Sammy
Stephan	Steve
Stuart	Stu
Theodore	Ted, Teddy
Thomas	Tom, Thom, Tommy
Timothy	Tim, Timmy
Walter	Walt, Wally
William	Bill, Billy, Will, Willy

FEMALE	
Amanda	Mandy
Catherine	Cathy, Cath
Christine	Chris, Chrissy
Cynthia	Cindy, Cynth
Deborah	Deb, Debbie
Elizabeth	Betty, Beth, Liz, Bess
Florence	Flo
Frances	Fran, Francie
Janet	Jan
Katherine	Kathy, Kate
Janice	Jan
Nancy	Nan
Pamela	Pam
Patricia	Pat
Roberta	Bobbie
Sophia	Sophie
Susan	Sue, Suzie
Teresa	Terry
Valerie	Val
Veronica	Ronnie
Yvonne	Vonna

My Model paper …

THE ASTRONOMICAL JOURNAL VOLUME 99, NUMBER 3 MARCH 1990

A SURVEY FOR CIRCUMSTELLAR DISKS AROUND YOUNG STELLAR OBJECTS

STEVEN V. W. BECKWITH
Department of Astronomy, Space Science Building, Cornell University, Ithaca, New York 14853

ANNEILA I. SARGENT
Department of Physics, Mathematics and Astronomy, California Institute of Technology, Pasadena, California 91125

ROLF. S. CHINI AND ROLF GÜSTEN
Max-Planck-Institute für Radioastronomie, Auf dem Hugel 69, D-5300 Bonn 1, Federal Republic of Germany
Received 6 July 1989; revised 3 November 1989

ABSTRACT

Continuum observations at 1.3 mm of 86 pre-main-sequence stars in the Taurus–Auriga dark clouds show that 42% have detectable emission from small particles. The detected fraction is only slightly smaller for the weak-line and "naked" T Tauri stars than for classical T Tauris, indicating that the former stars often have circumstellar material. In both categories, the column densities of particles are too large to be compatible with spherical distributions of circumstellar matter—the optical extinctions would be too large; the particles are almost certainly in spatially thin, circumstellar disks. Models of the spectral energy distributions from 10 to 1300 μm indicate that for the most part the disks are transparent at 1.3 mm, although the innermost ($\leqslant$1 AU) regions are opaque even at millimeter wavelengths. The aggregate particle masses are between 10^{-5} and 10^{-2} $\mathscr{M}_\odot$, implying total disk masses between 0.001 and 1 $\mathscr{M}_\odot$. The disk mass does not decrease with increasing stellar age up to at least 10^7 years among the stars detected at 1.3 mm. There is some evidence for temperature evolution, in the sense that older disks are colder and less luminous. There is little correlation between disk mass and Hα equivalent width among the detected stars, suggesting that the Hα line is not by itself indicative of disk mass. Spectral indices for several sources between 1.3 and 2.7 mm suggest that the particle emissivities ϵ are weaker functions of frequency ν than is the usual case of interstellar grains. Particle growth via adhesion in the dense disks might explain this result. The typical disk has an angular momentum comparable to that generally accepted for the early solar nebula, but very little stored energy, almost five orders of magnitude smaller than that of the central star. Our results demonstrate that disks more massive than the minimum mass of the proto-solar system commonly accompany the birth of solar-mass stars and suggest that planetary systems are common in the Galaxy.

I. INTRODUCTION

There is little doubt that the solar system was born from a disk of gas and dust encircling the Sun five billion years ago. The evidence that similar disks surround many young, solar-mass stars in the Galaxy today is compelling, although it is usually circumstantial. Basic quantities such as the disk mass are poorly constrained by available observations, however, making it impossible to ascertain the number of stars that will eventually have planetary systems like our own. If the distribution of mass and energy, the characteristics principally responsible for disk evolution, were known, we could begin to assess whether planetary systems are common or rare and, by comparing planetary evolution around neighboring stars, gain insight into our origins.

Most estimates suggest that approximately half of all young stars have disks. Strom *et al.* (1989; hereafter referred to as SSECS) use the presence of infrared emission in excess of that expected from a stellar photosphere to infer the presence of disks around 60% of the youngest pre-main-sequence stars in their sample. In a similar study, Cohen, Emerson, and Beichman (1989) examined 72 stars in Taurus–Auriga and concluded that about one-third of the stars have appreciable disks. Calculations of emission from circumstellar disks [Lynden-Bell and Pringle 1974; Adams, Lada, and Shu 1987 (hereafter referred to as ALS), 1988; Kenyon and Hartmann 1987; Bertout, Basri, and Bouvier 1988] demonstrate clear infrared signatures accompanying disks similar to the proto-solar nebula; these calculations provide the underpinnings for the observations cited above, but are not the only indicators of disk matter. The disks indirectly affect other radiation, for example, by shadowing the receding portions of stellar mass loss and creating preferentially blueshifted spectral lines (Edwards *et al.* 1987), asymmetric scattering of visual and near-infrared light from the stars (Beckwith *et al.* 1989), anomalously large extinction (Cohen 1983), and large degrees of polarization of the starlight (Bastien 1982; Hodapp 1984; Sato *et al.* 1985). But these effects are less useful for understanding the frequency with which disks occur.

At wavelengths shortward of 100 μm, these disks are usually opaque, making infrared and visual observations insensitive to the mass of the disks. The strengths of the far-infrared emission depends on the disks luminosity and temperature distribution, both strong functions of the energy balance in the disk (cf. Sec. IV*c*). To discuss the likelihood of planet formation, it is desirable to measure the total mass in a disk and its spatial distribution.

Thermal emission from small particles entrained in these disks is optically thin at wavelengths of order 1 mm and is proportional to the total particle mass (Beckwith *et al.* 1986; Sargent and Beckwith 1987). Observations of millimeter-wave emission from young stars provide an excellent way to measure disk masses directly, minimizing the uncertainties introduced by energetic activity near the star. With the unprecedented sensitivity and spatial resolution of the new

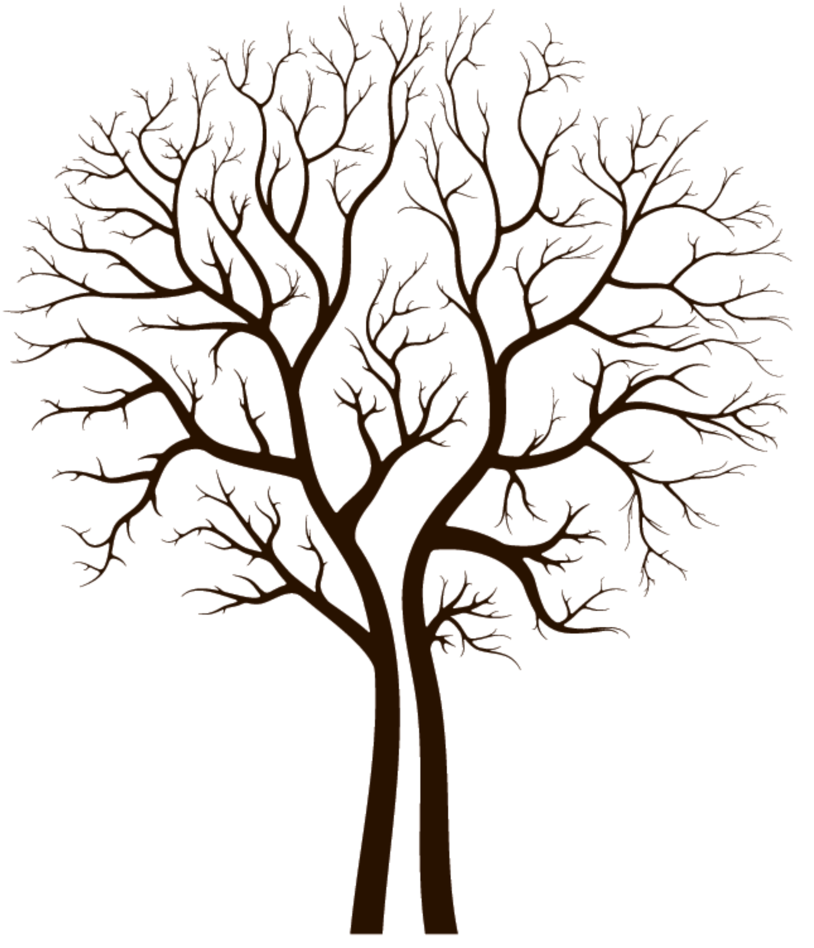
Sketch a Writing Plan

- (A rough title, clear contents)
- Section headings, subsections …
- Then to each paragraph, and each sentence
- Once concept/issue per paragraph.
- Mind the overall structure of the article.

  Introduction, Observations and Data Analysis, Results and Discussions, Conclusions
- Then tackle a sentence at a time.

Paper Structure

- Title = face
- Abstract = heart
- Key Words = address
- Headings = skeleton
- Introduction = hands
- Data and Analysis
- Discussion
  Visuals = voice
- Conclusion = smile
- References



First impression

Today, as the city's bowels demonstrate their usual constipation, the pouring rain adds a somewhat slimy aspect to the slow procession of traffic. Professor Leontief does not like arriving late at the lab. He hangs his dripping umbrella over the edge of his desk, at its designated spot above the trashcan, and he gently awakens his sleepy computer with some soothing words: "Come on, you hunk of metal and silicon oxide, wake up."

He checks his electronic mail. The third e-mail is from a scientific journal which he helps out as a reviewer. "Dear Professor Leontief, last month you kindly accepted to review the ...." He need not read any further. He looks at his calendar, and then feels the cold chill of panic run up his spine when he realises that the deadline is only 2 days away. He hasn't even started. So much to do with so little time! Yet, he cannot postpone his response. Being a resourceful man, he makes a couple of telephone calls and reorganises his work schedule so as to free up an immediately available 2-hour slot.

He pours himself a large mug of coffee, and extracts the article from the pile of documents pending attention. He goes straight to the reference section on the last page to check if his own articles are mentioned. He grins with pleasure. As he counts the pages, he looks at the text density. It shouldn't take too long. He smiles again. He then returns to the first page to read the abstract. Once read, he flips the pages forward slowly, taking the time to analyse a few visuals, and then moves to the conclusions, reading them with great care.

(Continued)

(Continued)

He stretches his shoulders and takes a glance at his watch. Twenty minutes have gone by since he started reading. By now, he has built a first and strong impression. Even though the article is of moderate length, it is too long for the depth of the proposed contribution. A letter would have been a more appropriate format than a full-fledged paper. Poor researcher. He will have to say this, using diplomatic skills so as not to be discouraging, for he knows the hopes and expectations that all writers share. What a shame, he thinks. Had he accepted the paper, his citation count would have increased. Now the hard work of thorough analysis lies ahead. He picks up his coffee mug and takes a large gulp.

The first impression of a paper is formed after a partial reading. During the first 20 minutes or so, a reviewer does not have time to read the whole paper, in particular the methodology and the results/discussion sections. I have therefore decided to cover in part II only those parts of a paper that are read during the rapid time in which the first impression is formed. This decision was also based on comments from scientists who have published many papers. They stated that the methodology and results sections of their paper were the easiest and fastest to write, but it was the other parts that were difficult and took time: the abstract, introduction, and conclusions. As for the title, structure, and visuals, they recognised that they had underestimated the key role these parts play in creating the first impression.

The impact of the quality of these parts goes beyond creating a favourable first impression for the reviewer and reader. Improved

Title --- How to select one

Try alternative titles …

- What are the differences
- Pair elimination
- The best one should be tempting and informative
- Author’s contribution should come first

Title (cont.)

- The title is not read; it is scanned, within 2 seconds at most
- A long easily understood title *is better than* a short one with nouns to be unpacked, *which in turn is better than* an ambiguous one
- An old or popular subject → a longer title in order to specify the contribution

Six Techniques to improve titles

1. Placement of Contribution First

For a full sentence, the new information usually appears at the end and the old information at the beginning.

In a verbless title, however, the situation is reversed.

2. Using Verbal Forms

A verb gives energy. So use gerunds （動名詞）or infinitives （不定詞）to energize your title.

For example:

Data learning: Understanding astronomical Data

3. Using Adjectives or Numbers to Stress contribution

Fast, highly efficient, robust, but not new or novel

The most specific, the better, e.g., 5 Hz sampling *is better than* fast sampling

4. Clear and Specific Keywords

Easier to locate by a search engine or database

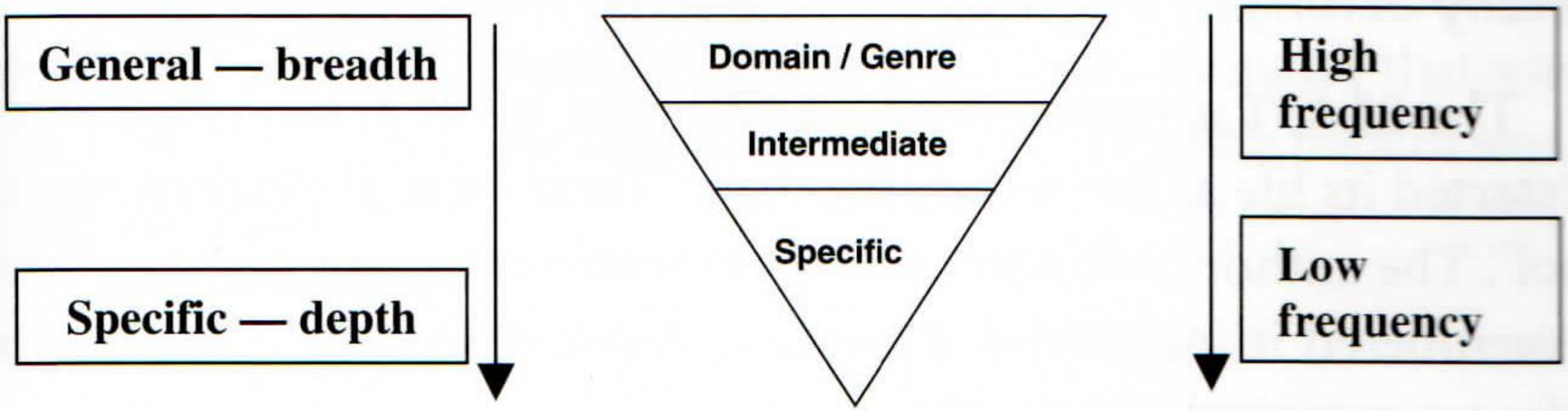
5. Smart Choice of Keywords

Pick your keywords from recent or often-cited titles close to your contribution
→ searches to retrieve those will also find yours

If two keywords are equally good, choose one for the title and the other for the abstract.

6. Catchy Acronyms

MACHO, TAOS



☛**1. Keyword depth and breadth.** Specialised keywords are at the pointed lower end of the inverted triangle. General keywords are at the broad top end of the triangle. The general-to-specific scale correlates with the frequency of use of a scientific keyword. Depth and breadth of a keyword are not intrinsic qualities, but rather depend on the frequency of use of these words in the journal that publishes the paper. For example, the reader of *Science* may consider "nanopattern" very specific, yet the reader of the *Journal of Advanced Materials* will find it quite generic. The reader's knowledge also influences the perception of keyword levels: the less knowledgeable the reader is, the more the general keywords will seem specific, and vice versa.

network) are useful to describe the domain or the type of your work/paper, but they have very little differentiating power precisely because they frequently appear in titles. They do not help to place your title at the top of the reader's list. Intermediate keywords are better at differentiating. They are usually associated with methods common to several fields of research (*fast Fourier transform, clustering, microarray*) or to large subdomains (*fingerprint recognition*). But, for maximum differentiation, specific keywords are unbeatable (*hypersurface, hop-count localisation, nonalternative spliced genes*). For a given journal, or for domain experts, the category of a keyword is well defined. It changes from journal to journal, or from experts to nonexperts.

Make sure your title has keywords at more than one level of the triangle. If too specific, your title will only be found by a handful of experts in your field; it will also discourage readers with a sizeable knowledge gap. If too general, your title will not be found by experts. The keyword choice decision is yours. Be wise.

So a good title should be

unique, lasting, concise, clear, easy to find, honest and representative, and (if possible) catchy

A question for the title?

Catchy title . . . but how?

Here are seven proven ways:

(1) Adjectives are attractive.

(2) Some keywords carry the passion of the time. Encountering them in titles excites the reader who is keen to keep up to date with the latest happenings in science.

(3) Verbal forms (gerundive and infinitive) are more active and potent than strings of nouns connected by prepositions.

(4) A shorter title is more attractive than a long one, and a general title is more attractive than a specific one.

(5) Words that announce the unexpected, the surprising, or the refutation of something well established all fuel the curiosity of the reader.

(6) Unusual words that belong to a different lexical field intrigue the reader.

(7) Questions are great, but are often reserved for the few who have reached professorship or Nobel Prize status.

To make a title catchy, there is only one rule: catchy, yes; dishonest, no.

What do you think of your title? Does it have enough of the qualities mentioned here? Is your contribution featured at the head of your title? It is time to have a closer look.

HW: Let us be critical …
Select 10 titles from the latest ApJ issue. Do the same for 10 titles in RAA.

What is the title you have come up with for your thesis/paper? Bring it to our discussion.