

The title is a key element of any form of scientific communication.

The quality and effectiveness of your title is critical in attracting a reader's attention and in getting appropriate "hits" in electronic databases.

Here, we focus on how to write a title for maximum effect.

## **You'll need effective titles for all sorts of things, not just journal articles**

**Internal reports to bosses**

**Technical reports to customers**

**Proposals to customers and funding agencies**

**Talks**

**Websites and electronic media**

Over the course of your career, you'll write dozens if not hundreds of abstracts, journal papers, technical reports, proposals, press releases, letters, and memos. Every one of them will have a title, which will influence the probability your document will be read and acted upon.

## How do you decide which article to read or which talk to go to?

- 5 Hacker News** [new](#) | [comments](#) | [show link](#) | [jobs](#) | [submit](#)
1. **Oil Crash is Kicking Off One of the Largest Wealth Transfers in History** ( [Bloomberg.com](#))  
17 points by [mohamed1](#) 2 hours ago | 11 comments
  2. **Turn your PC upside down to boot into Linux (2003)** ([twinkl.com](#))  
492 points by [Pacheco](#) 2 hours ago | 55 comments
  3. **Show HN: 3D Vector Graphics** ([github.com](#))  
14 points by [tugboat](#) 2 hours ago | 2 comments
  4. **Bank of Japan, in a Surprise, Adopts Negative Interest Rate** ([nytimes.com](#))  
122 points by [dave](#) 3 hours ago | 12 comments
  5. **Code Blocks: open-source, cross platform, free C, C++ and Fortran IDE** ([codeblocks.org](#))  
52 points by [mohamed1](#) 3 hours ago | 2 comments
  6. **Quiver: The Programmer's Notebook** ([quiverapp.com](#))  
21 points by [mohamed1](#) 3 hours ago | 1 comment
  7. **Health and Science: a one-time party drug is helping people with deep depression** ([washingtonpost.com](#))  
41 points by [mohamed1](#) 3 hours ago | 10 comments
  8. **Death of a Troll** ([theatlantic.com](#))  
92 points by [mohamed1](#) 3 hours ago | 10 comments
  9. **An algorithm to automatically turn photos of food into faces** ([santandell.com](#))  
122 points by [mohamed1](#) 3 hours ago | 10 comments
  10. **D3 and Leaflet maps** ([code.org](#))  
14 points by [mohamed1](#) 3 hours ago | 10 comments
  11. **Small exercises to get you used to reading and writing Rust code** ([github.com](#))  
12 points by [mohamed1](#) 3 hours ago | 10 comments
  12. **Cheerp: L2 - C++ to JavaScript: faster than Emcripten with dynamic memory** ([cheerp.tech](#))  
47 points by [mohamed1](#) 3 hours ago | 10 comments
  13. **Implementing the Elm Architecture in Swift** ([codecademy.com](#))  
44 points by [mohamed1](#) 3 hours ago | 10 comments
  14. **Microcontainers - Yarn, Portable Docker Containers** ([codecademy.com](#))  
122 points by [mohamed1](#) 3 hours ago | 10 comments
  15. **Show HN: Write blog in Emacs with hexo/long page** ([github.com](#))  
44 points by [mohamed1](#) 3 hours ago | 10 comments
  16. **Recognizing and Localizing Right Whales with Extremely Deep Neural Networks** ([github.com](#))  
20 points by [mohamed1](#) 3 hours ago | 10 comments
  17. **The many ways of handling TCP RST packets** ([codecademy.com](#))  
44 points by [mohamed1](#) 3 hours ago | 10 comments
  18. **A developmental disorder promises a new window onto the brain's secrets** ([codecademy.com](#))  
12 points by [mohamed1](#) 3 hours ago | 10 comments
  19. **Show HN: LED Notifications for Tests Using Node and Arduino** ([codecademy.com](#))  
44 points by [mohamed1](#) 3 hours ago | 10 comments
  20. **Cracked (YC W12) is hiring a PM for an exciting new business vertical** ([cracked.com](#))  
4 hours ago
  21. **Theories on Artificial Expression** ([codecademy.com](#))  
2 points by [mohamed1](#) 3 hours ago | 10 comments
  22. **Data Ingress and Egress for Cryogenic Systems** ([codecademy.com](#))  
2 points by [mohamed1](#) 3 hours ago | 10 comments
  23. **Phantom Time Hypothesis** ([codecademy.com](#))  
44 points by [mohamed1](#) 3 hours ago | 10 comments
  24. **Chopra Survey 2015 Analysis** ([codecademy.com](#))  
52 points by [mohamed1](#) 3 hours ago | 10 comments
  25. **Fake Online Locksmiths May Be Out to Pick Your Pocket, Too** ([nytimes.com](#))  
44 points by [mohamed1](#) 3 hours ago | 10 comments

- A14.0001: Transport signatures of Majorana quantum states realized by dissipative resonant tunneling**  
Huaxu Zheng, Serge Florens, Harold Baranger  
[Review Abstract](#)
- A14.0002: Metallic transport near a quantum critical point in organic superconductors from a renormalized Bogoliubov theory**  
Maryam Shabdoz, Claude Bourbonnais  
[Review Abstract](#)
- A14.0003: Magnetic and long quantum phase transitions in a model for nonequilibrium driven spin glasses**  
Junda Wu, Qimiao Si, Efrat Aharony  
[Review Abstract](#)
- A14.0004: Rigidity criticality in a two-dimensional metal**  
Subir Sachdev, Debanjan Chowdhury  
[Review Abstract](#)
- A14.0005: Quantum Criticality in Layered  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$**   
L. S. Yu, W. J. Guan, K. Park, M. S. Kim, A. A. Zaitsev, J. A. Rodriguez-Rivera, C. Broholm, A. M. Tsvelik, M. C. Aronson  
[Review Abstract](#)
- A14.0006: Quantum critical point of Dirac fermions studied using efficient continuous time projector quantum Monte Carlo method**  
Lei Wang, Mauro Tazzi, Philippe Corboz, Matthias Troyer  
[Review Abstract](#)
- A14.0007: Steady state dynamics and effective temperatures of quantum criticality in open systems**  
Nathan Kirchner, Farzaneh Zamani, Pedro Ribeiro  
[Review Abstract](#)
- A14.0008: Quantum phase transitions in the Hondo-neckless model**  
Nader Ghazemi, Shayan Hemmadyan, Mahsa Rahimi Movassagh, Mahdi Karaghan, Ali T. Rezakhanlou, Abdollah Langan  
[Review Abstract](#)
- A14.0009: Emergent space-time supersymmetry in 3D Ising universality and 2D Dirac universality**  
Shao-Kai Jian, Yi-Fan Jiang, Hong Yao  
[Review Abstract](#)
- A14.0010:  $\text{P}^{\text{t}}$  studies of emergent supersymmetry at the pair density wave transitions of Dirac fermions in  $\text{ZrSi}$**   
Yifan Jiang, Jiquan Pei, Shaokai Jian, Hong Yao  
[Review Abstract](#)
- A14.0011: Hine Uniqueness in Total Electron Transmission through Nanostructures**  
Quantum Dragons II  
Mark Nevotny  
[Review Abstract](#)
- A14.0012: Single and Multi-channel Quantum Dragons from Rectangular Nanotubes**  
Zhou Li, Mark Nevotny  
[Review Abstract](#)

You usually make a snap judgment based on the title...

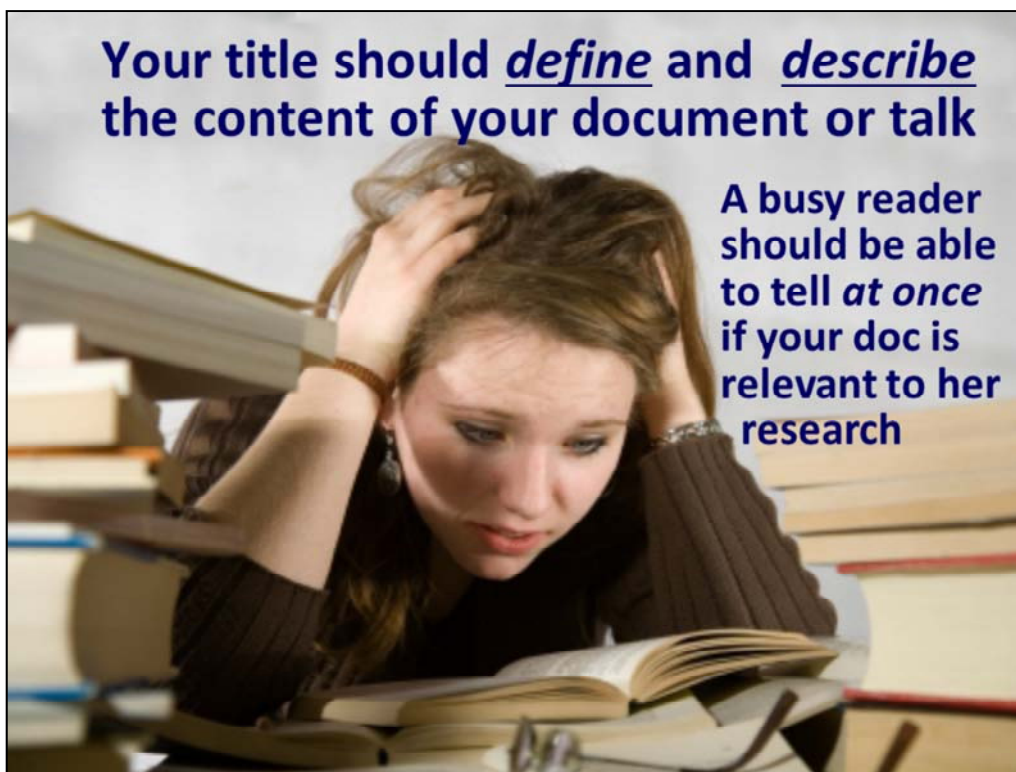
Scientists have a finite amount of time to devote to reading the literature or attending talks. When presented with a long list of options, most will decide in a few seconds whether to explore the paper or the talk further.



Busy scientists employ three criteria when deciding if they will invest their time in reading a paper or attending a talk:

1. The information conveyed in the title.
2. The reputation of the author—if you're a young scientist without a reputation yet, see #1 and #3.
3. The abstract (more about abstracts:  
<http://people.physics.illinois.edu/Celia/Abstracts.pdf>)

The title must accurately and succinctly convey the content of the paper and allow a busy reader to immediately decide if the paper is applicable to his or her work.



Write down key words that define and describe your paper. These are the words that belong in your title.

A title cannot capture every nuance of every detail of the paper, but it should accurately and specifically represent “the big picture.”

Scientists scan down a list of titles in the table of contents in a journal, or the latest postings to one of the electronic archives, or to the results of an electronic lit search; you have  $\approx 1$  sec to capture their attention.



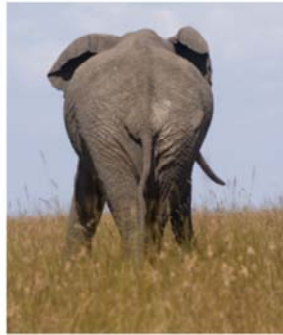
The title must accurately and succinctly convey the content of the paper.

Play fair; don't "trick" people into reading your paper by a misleading title.  
Wastes their time.

Ruins your reputation (see point #2 in the notes for Slide 4).

**Make it interesting, but not  
*too interesting...***

**“Looking from the East at an Elephant Trotting  
West: Direct CP Violation in  $B^0$  Decays”**



**I am not making this up—<http://arxiv.org/abs/hep-ph/0203157>**

Science is a serious business, and most scientists are fairly conservative. Don't alienate future readers by presenting them with a silly title.



## Keep titles as short as possible



**<12 words;  
<10 is even better\***

**Your prospective reader is not going to  
remember more than that many words anyway**

**\*That's about the number of words a reader can take in  
and process as he or she is scanning down a list**

Limit titles to <12 words; <10 is even better. That's about the span of words the human eye can recognize and process as it is scanning down a list.

Important papers don't have to have long, "impressive" titles:

"Theory of superconductivity," J. Bardeen, L. Cooper, and J.R. Schrieffer, *Phys. Rev.* **108**, 1175 (1957). Three words; cited 11 748 times (Google Scholar, 6/20/2016).

*Principles of Magnetic Resonance*, Charles P. Slichter, 3rd. ed. (New York, Springer, 1990). Four words; cited 8350 times (Google Scholar, 6/20/2016).

"Ground state of the electron gas by a stochastic method," D.M. Ceperley and B.J. Alder, *Phys. Rev. Lett.* **45**, 566 (1980). Ten words; cited 12 568 times (Google Scholar, 6/20/2016).

"Dynamics of the dissipative two-state system," A.J. Leggett et al., *Rev. Mod. Phys.* **59**, 1 (1987). Seven words; cited 4199 times (Google Scholar, 6/20/2016).

"Spin echoes," E.L. Hahn, *Phys. Rev.* **80**, 580 (1950). Two words; cited 5317 times (Google Scholar, 6/20/2016).

Try an experiment. Go to <http://arXiv.org/list/physics/recent>, and see how much time you spend looking at the titles of each article as you scan down the list before you decide whether a paper looks interesting and worth investigating further.



## Help your poor reader; put keywords first



**Original Title:** Application of the time-dependent local density approximation to conjugated molecules

**My edit:** *Time-dependent local density approximation for conjugated molecules*

**Original Title:** A novel approach to estimate the stability of one-dimensional quantum inverse scattering

**My edit:** *New stability estimate for 1D quantum inverse scattering*

Have pity on your busy, overwhelmed readers. Make it easy for them to understand the subject of your paper immediately.

Front load the key words to attract a busy reader's attention.

Examples:

Original Title #1: 11 words, introductory fluff

Improvement #1: 8 words, keywords front loaded

Original Title #2: 13 words, introductory fluff, "a novel approach" will be discussed next...

Improvement #2: 8 words, keywords first

## No introductory fluff

~~On the nature of the~~ “hostless” short GRBs

~~Capabilities of~~ parallel analyses of the structure of materials by field ion and scanning probe microscopy

~~Unveiling the~~ impurity band induced ferromagnetism in the magnetic semiconductor (Ga,Mn)As

**“Frontload” key words; get them on the left side of the list to grab a reader’s attention**



Good advice from AIP: “Words that do not carry information, such as “The...,” “A...,” “On...,” “Investigation of...,” “Study of...” should be omitted from titles.”

The *Phys. Rev.* journals also proscribe

**“More about...”, “...revisited”, and dangling participles (“...using...”)**

**No introductory fluff**

~~On the nature of the~~ “hostless” short GRBs  
**“Hostless” short gamma ray bursts**

~~Capabilities of~~ parallel analyses of the  
structure of materials by field ion and  
scanning probe microscopy (14 words)  
**Field ion vs scanning probe microscopy  
for materials characterization** (9 words)

~~Unveiling the~~ impurity band induced  
ferromagnetism in the magnetic  
semiconductor (Ga,Mn)As  
**Impurity band-induced ferromagnetism  
in (Ga,Mn)As**



Write out the acronym in the first title; not every potential reader may know what a GRB is.

**Do not use qualitative words**



**“novel” “interesting” “important”**

**(that’s up to the reader to decide)**

Do not use words in the title that make qualitative statements about the work being reported:

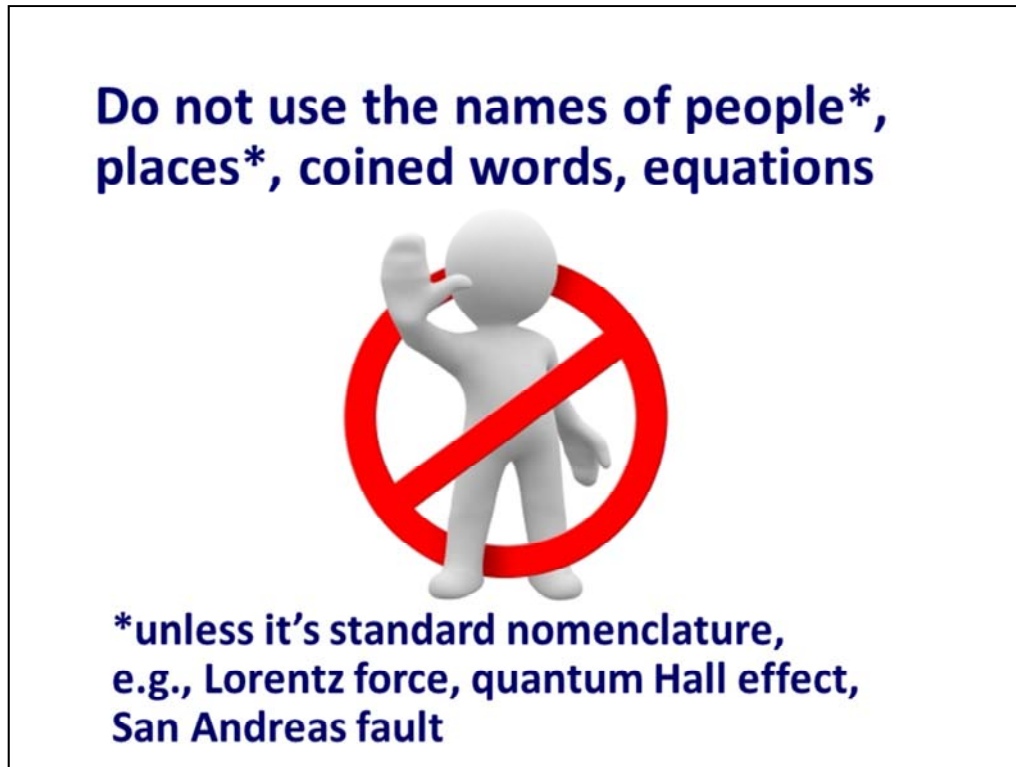
“precise,” “accurate”

“important,” “influential”

“innovative,” “unique,” “unprecedented,” “ground-breaking,” “brilliant”

“new”--maybe

**Quantitative** statements are okay, e.g., “Measurement of the negative muon anomalous magnetic moment to 0.7 ppm,” G.W. Bennett et al., *Phys. Rev. Lett.* **92**, 161802 (2004).



The *Phys. Rev.* journals also proscribe the name of the accelerator or the type of detector used in paper titles (but the particle physicists seem to violate this rule constantly and with impunity—*cme*).

“people’s names”—unless they are a common adjective. “Fourier transform,” “Green’s function,” “Auger spectroscopy,” “Brillouin limit” are fine. “New Results from the DeMarco Laboratory at the University of Illinois” is not.

“coined words”—if the word isn’t used outside your own research group, don’t put it in the title; same thing goes for narrow, technical jargon. Exception: “Mottness,” P. Phillips, *Ann. Phys.* **321**, 1634-1650 (2006). **BUT**—he’d written about 10 papers on this topic before publishing “Mottness,” and the editor fought him on it anyway.

“equations”—don’t put anything in a title that cannot be rendered in straight ASCII text.



## No unfamiliar acronyms

**Original Title: One-dimensional SPH method**

**My edit: Smoothed-particle hydrodynamics 1D method  
for gas dynamics applications**

**Original Title: Application of CVS filtering to mixing in  
two-dimensional homogeneous turbulence**

**My edit: Coherent-vortex-simulation filtering for 2D  
homogeneous turbulence**

“unfamiliar acronyms”—the AIP Style Guide provides a list of acronyms that are so common they don’t have to be defined at first use; anything else, leave out of the title.

Examples of allowed acronyms: BCS, bcc, cw, EPR, ESR, fcc, ir, NMR, QCD, QED, rf, RNA, uv

**Original Title: One-dimensional SPH method**

**IMPROVED Title: *Smoothed-particle hydrodynamics 1D method for gas dynamics applications***

NOTE: Although this title is longer than the original, it avoids the unfamiliar acronym and provides specific information that may be needed by the reader; the original title is probably too generic to be useful.

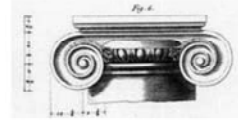
**Original Title: Application of CVS filtering to mixing in two-dimensional homogeneous turbulence**

**IMPROVED Title\*: *Coherent-vortex-simulation filtering for 2D homogeneous turbulence***

*\*This example may or may not be an “improved” title; it depends on what the author deems is most important and would be of most interest to readers.*



## How do I decide what words to capitalize in a title?\*



Some journals use “title” capitalization and some use “sentence” capitalization

*Physical Review Letters*

“Complexity of Small Silicon Self-Interstitial Defects”

*Physical Review B*

“Electronic excitations on silver surfaces”

*Science*

“Evidence for 2D Ising superconductivity in gated MoS<sub>2</sub>”

Always capitalize the names of proper nouns, even when using sentence capitalization

“Classification of gapless  $\mathbb{Z}_2$  spin liquids in 3D Kitaev models”

**\*Just look it up...**

There’s no consistency to the use of capitalization in paper titles—not even among journals published by the same organization. Just look it up. If you’re sure you know, look it up anyway. You will learn humility.

*Acta Crystallographica*

Crystallography of a new metastable phase in Zr-N alloy

*Nuclear Physics B*

Five-loop  $\epsilon$  expansion for  $O(n) \times O(m)$  spin models

*Physical Review Letters*

Extracting Information about the Initial State from Black Hole Radiation

*Physical Review B*

Emergence of integer quantum Hall effect from chaos

*Science*

Activation of Cu(111) surface by decomposition into nanoclusters driven by C) adsorption

In “title” capitalization, the first word and all words except prepositions and articles are capitalized.

In “sentence” capitalization, only the first word, proper nouns, and some acronyms are capitalized.

More capitalization rules for science writing:

<http://people.physics.illinois.edu/Celia/Caps&Acronyms.pdf>.



**Now for some  
practice:**



**Remember: A good title is  
concise, descriptive, interesting**

**“Investigation of accumulation, evolution,  
and penetration of gaseous products  
produced by nuclear fission reactions”**

***Behavior of gaseous nuclear-fission products***

**“An Overall Picture of the Gas Flow in  
Massive Cluster Forming Region: The Case  
of G10.6-0.4”**

***Gas Flow in Massive Cluster-Forming  
Region G10.6-0.4***

**As a matter of principle, I don't like colon-ated  
titles; they are often just an excuse for a run-on  
title—*cme***

**“Pair contact process with diffusion of pairs”**



**“Pair contact process with diffusion of pairs”**



**“Efficiency for preforming molecules from mixtures of light Fermi and heavy Bose atoms in optical lattices: the strong-coupling-expansion method”**

21 words! Colon-ated title! <sigh>

***Strong-coupling expansion method for efficiently preforming light-Fermi-heavy-Bose molecules in optical lattices***

**“Optimization of the Neutrino Factory,  
~~revisited~~”**

**knowing what kind of “optimization”  
would be nice, too**



~~“A note on the~~ implications of gauge  
invariance in QCD”

**“A meaningful expansion around detailed balance”**



**“Unique nature of the lowest Landau level  
in finite graphene samples with zigzag  
edges: Dirac electrons with mixed bulk-  
edge character”**



## **To recap:**

**Keep it short**

**Frontload key words**

**Provide specific information**

**Make it interesting  
(but not silly)**



**[cmelliot@illinois.edu](mailto:cmelliot@illinois.edu)**