

# Writing Effective Titles

PHYSICAL REVIEW LETTERS  
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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**

Learning to write effective titles is important for more people than academic physicists who write journal articles.

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

The screenshot shows a web browser displaying a table of contents for a journal. The table lists several articles with their titles and authors. The titles are:
 

- 1. Dynamic surface-enhanced Raman spectroscopy and Chemometric methods for fast detection and intelligent identification of methylphenidate and 3,4-Methylenedioxy methylphenidate in human urine
- 2. Pressure induced superconductivity in the antiferromagnetic Dirac material BaMnB2
- 3. High-Tc superconductivity in undoped ThF4N
- 4. Bi-2212/1T-TaS2 Van der Waals junctions: Interplay of proximity induced high-Tc superconductivity and CDW order
- 5. Dopant size effects on novel functionalities: High-temperature interfacial superconductivity
- 4. Phonon-mediated high-Tc superconductivity in hole-doped diamond-like crystalline hydrocarbon
- 7. Emergence of superconductivity in doped H2O ice at high pressure
- 8. Improving superconductivity in BaFe2As2 based crystals by orbital clustering and electronic uniformity
- A14.00001. Transport signatures of Majorana quantum criticality realized by dissipative resonant tunneling
- A14.00002. Helical transport near a quantum critical point in organic superconductors from a renormalized Boltzmann theory
- A14.00003. Intrinsic and first quantum phase transitions in a model for isostructurally tuned iron pnictides
- A14.00004. Higgs criticality in a two-dimensional metal
- A14.00005. Quantum Criticality in Layered YTe2 CuSAs1-xSx
- A14.00006. Quantum critical point of Dirac fermions studied using efficient continuous-time projector quantum Monte Carlo method
- A14.00007. Steady state dynamics and effective temperatures of quantum criticality in open systems
- A14.00008. Quantum phase transitions in the Kondo-necklace model
- A14.00009. Emergent space-time supersymmetry in 3D Weyl semimetals and 2D Dirac semimetals
- A14.00010. iPEPS studies of emergent supersymmetry at the pair density wave transitions of Dirac fermions in 2+1D
- A14.00011. How Ubiquitous is Total Electron Transmission through Nanostructures (Quantum Dragons)?
- A14.00012. Single and Multi-channel Quantum Dragons from Rectangular Nanotubes

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

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.

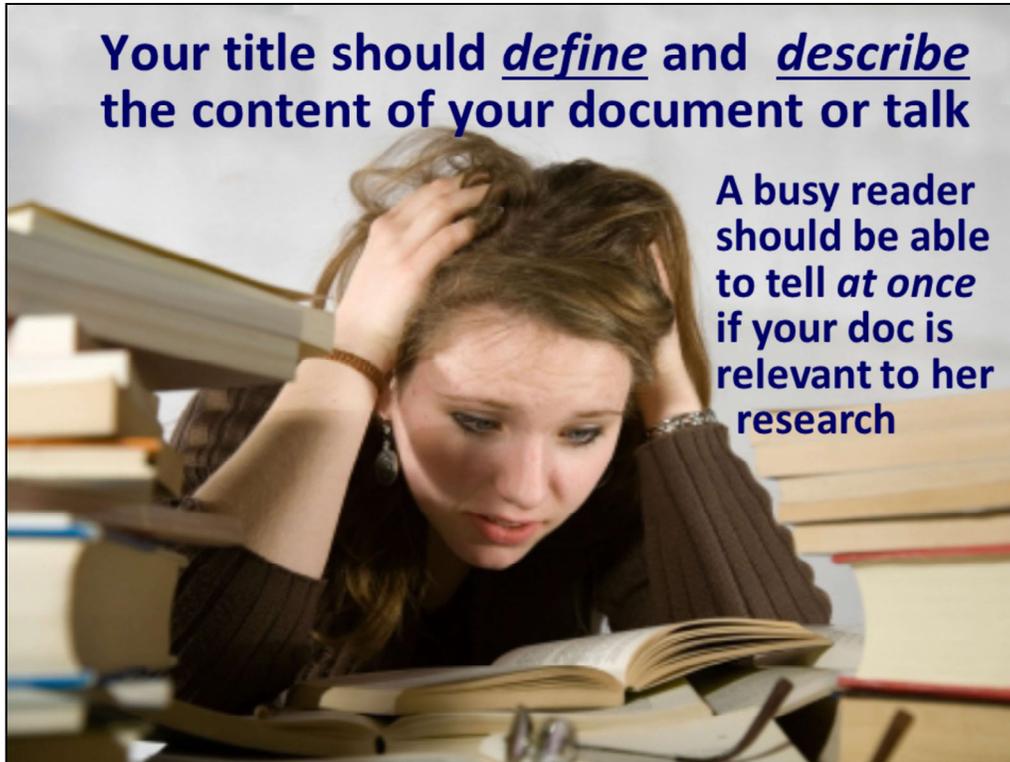
Try an experiment. Go to <http://arXiv.org/list/physics/recent>, and see how much time you spend looking at the titles of each article as you scan down the list before you decide whether a paper looks interesting and worth investigating further.



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 next week...)

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.”



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

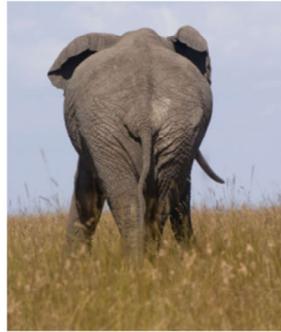
Play fair; don't "trick" people into reading your paper by a misleading title.

Wastes their time.

Ruins your reputation (see point #2 on 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>

No comment necessary.

## Keep titles as short as possible



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

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

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

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 6142 times (Scopus, 8/21/2019).

*Principles of Magnetic Resonance*, Charles P. Slichter, 3rd. ed. (New York, Springer, 1990). Four words; cited 9441 times (Google Scholar)

"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 10 893 times (Scopus, 8/21/2019)

"Dynamics of the dissipative two-state system," A.J. Leggett et al., *Rev. Mod. Phys.* **59**, 1 (1987). Seven words; cited 3470 times (Scopus, 8/21/2019)

"Spin echoes," E.L. Hahn, *Phys. Rev.* **80**, 580 (1950). Two words; cited 3258 times (Scopus, 8/21/2019)

## 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 acronyms in all titles; 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).

**Do not use the names of people\*,  
places\*, coined words, equations**



**\*unless it's standard nomenclature,  
e.g., Lorentz force, quantum Hall effect,  
de Broglie wavelength**

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. “Important New Results from the Mason 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 or define it.

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***

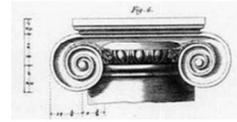
NOTE: Although this title is longer than the original, it avoids the unfamiliar acronym and provides specific information that may be needed by the reader; the original title is probably too generic to be useful.

**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”**



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

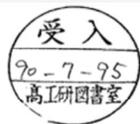
**knowing what kind of “optimization”  
would be nice, too**

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

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



## Hinchliffe's rule for titles:



IS HINCHLIFFE'S RULE TRUE? ·

Boris Peon

**We'll talk about  
abstracts next week**

Abstract

Hinchliffe has asserted that whenever the title of a paper is a question with a yes/no answer, the answer is always no. This paper demonstrates that Hinchliffe's assertion is false, but only if it is true.

**To recap:**

**Keep it short**

**Frontload key words**

**Provide specific information**

**Make it interesting**



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