

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

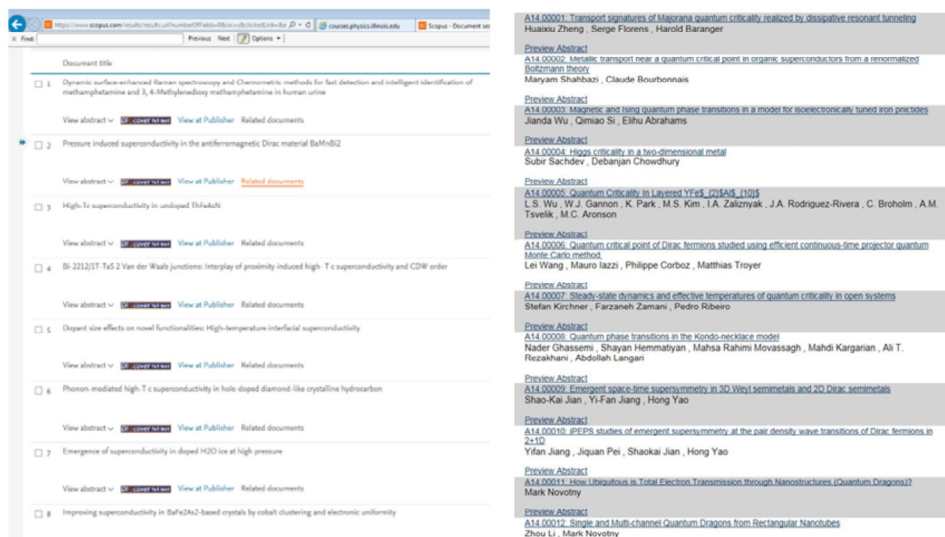
Talks

Websites and electronic media

2

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 image shows a screenshot of a journal's table of contents on the left and a list of article titles with abstracts on the right. The table of contents lists eight items, each with a checkbox and a title. The article titles on the right are:

- A14.00001. Transport signatures of Majorana quantum critically realized by dissipative resonant tunneling
- A14.00002. Anomalous transport near a quantum critical point in organic superconductors from a renormalized Bogomolny theory
- A14.00003. Magnonic and spin quantum phase transitions in a model for nonequilibrium-tuned iron peroxide
- A14.00004. Higgs criticality in a two-dimensional metal
- A14.00005. Quantum Criticality in Layered $\text{YFe}_2\text{P}_2\text{S}_8$ (110)
- A14.00006. Quantum critical point of Dirac fermions studied using efficient continuous-time projector quantum Monte Carlo method
- A14.00007. Strong-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. QPEPS 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...

3

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 ≈ 1 s to capture their attention.

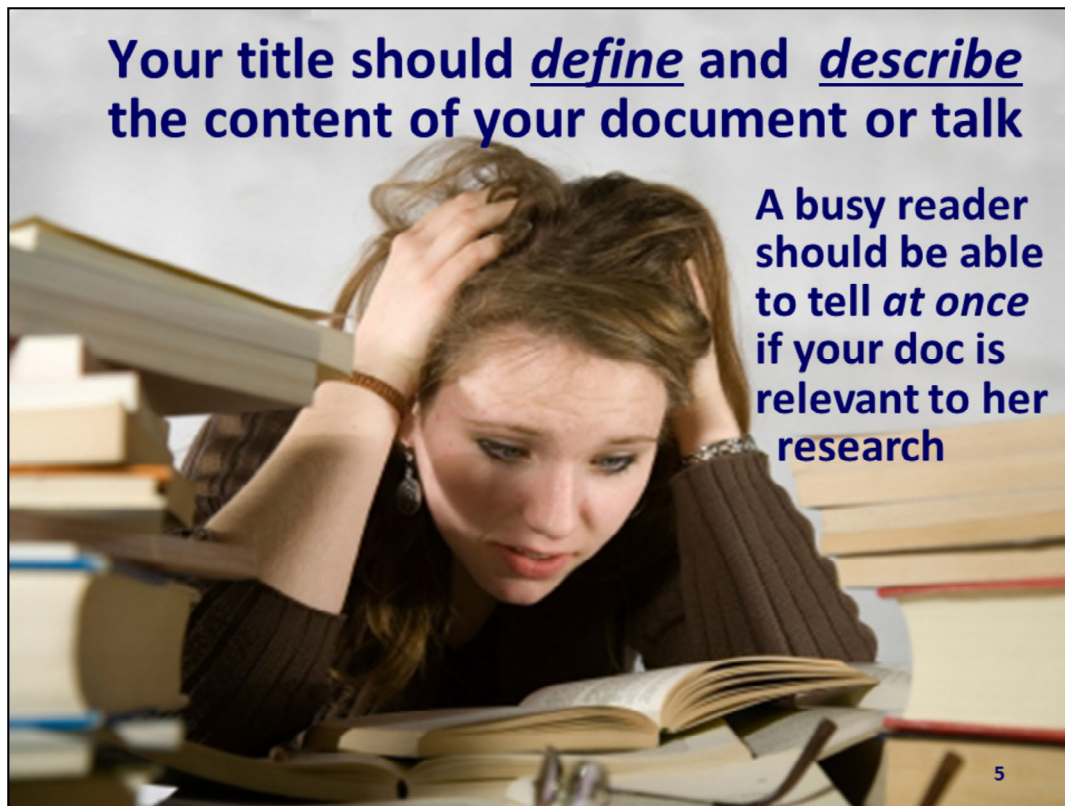
Try an experiment. Go to <http://arXiv.org/list/physics/recent>, and see how much time you spend looking at the titles of each article as you scan down the list before you decide whether a paper looks interesting and worth investigating further.



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.”



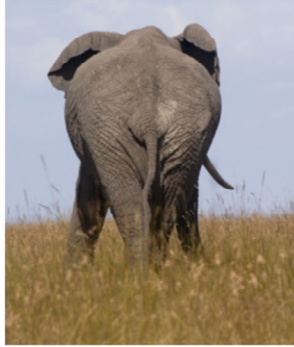
The title must accurately and succinctly convey the content of the paper.

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>

7

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

8

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 7369 times (Scopus, 8/24/2021).

Principles of Magnetic Resonance, Charles P. Slichter, 3rd. ed. (New York, Springer, 1990). Four words; cited 11 000 times (Google Scholar, 8/24/2021).

"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 12 080 times (Scopus, 8/24/2021)

"Dynamics of the dissipative two-state system," A.J. Leggett et al., *Rev. Mod. Phys.* **59**, 1 (1987). Seven words; cited 3873 times (Scopus, 8/24/2021)

"Spin echoes," E.L. Hahn, *Phys. Rev.* **80**, 580 (1950). Two words; cited 3640 times (Scopus, 8/24/2021)

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

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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

10

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 (11 words)
Impurity band-induced ferromagnetism in (Ga,Mn)As (6 words)



11

Write out acronyms in all titles*; not every potential reader may know what a GRB is.

**HOWEVER*, some acronyms are so widely recognized in physics that they need not be defined; see https://courses.physics.illinois.edu/PHYS496/fa2022/Resources/AIP_Style_4thed.pdf, Appendix D, p. 44.

*Hey, it's English. Exceptions are the norm.

Do not use qualitative words



“novel” “interesting” “important”

(that’s up to the reader to decide)

12

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**

13

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. “Amazing New Results from the Kwiat 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**

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“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*

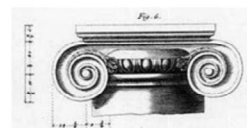
NOTE: Although this title is longer than the original, it avoids the unfamiliar acronym and provides specific information that may be needed by the reader; the original title is probably too generic to be useful.

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 MoS₂”

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...** 15

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 ϵ 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**

16

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

Behavior of gaseous nuclear-fission products

17

“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”

19

“Pair contact process with diffusion of pairs”



20

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

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

21

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

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

22

The QCD abbreviation for quantum chromodynamics is okay in this title, because QCD is considered by the American Institute of Physics to be so commonly recognized in physics that it need not be defined.

Copy editor’s marks:

The horizontal line with a squiggle at the right end, written over a word or phrase, means “delete.”

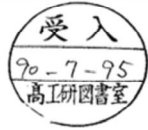
The three horizontal lines beneath a letter means “capitalize this letter.”

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



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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.

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To recap:

Keep it short

Frontload key words

Provide specific information

Make it interesting (but not too interesting)



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<http://physics.illinois.edu/people/Celia/>