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.
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 2).
Make it interesting, but not *too interesting*...

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

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 sec to capture their attention.

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:
“Spin echoes,” E.L. Hahn, Phys. Rev. 80, 580 (1950). Two words; cited 5208 times (Google Scholar)

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
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...”)
Write out the acronym in the first title; not every potential reader may know what a GRB is.
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, San Andreas fault

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 ASCI text.
“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
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

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...*

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 \( \varepsilon \) 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:
To recap:

- Keep it short
- Frontload key words
- Provide specific information
- Make it interesting

cmelliot@illinois.edu