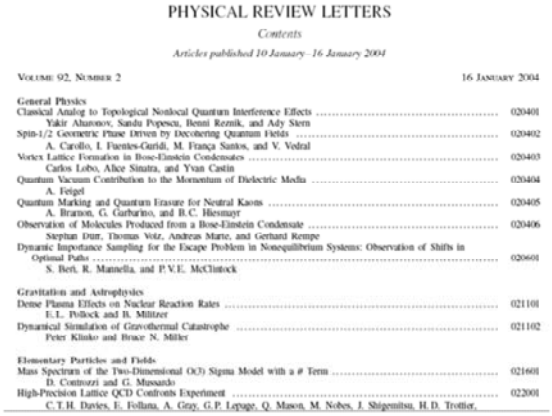
Writing Effective Titles



PHYSICAL REVIEW LETTERS

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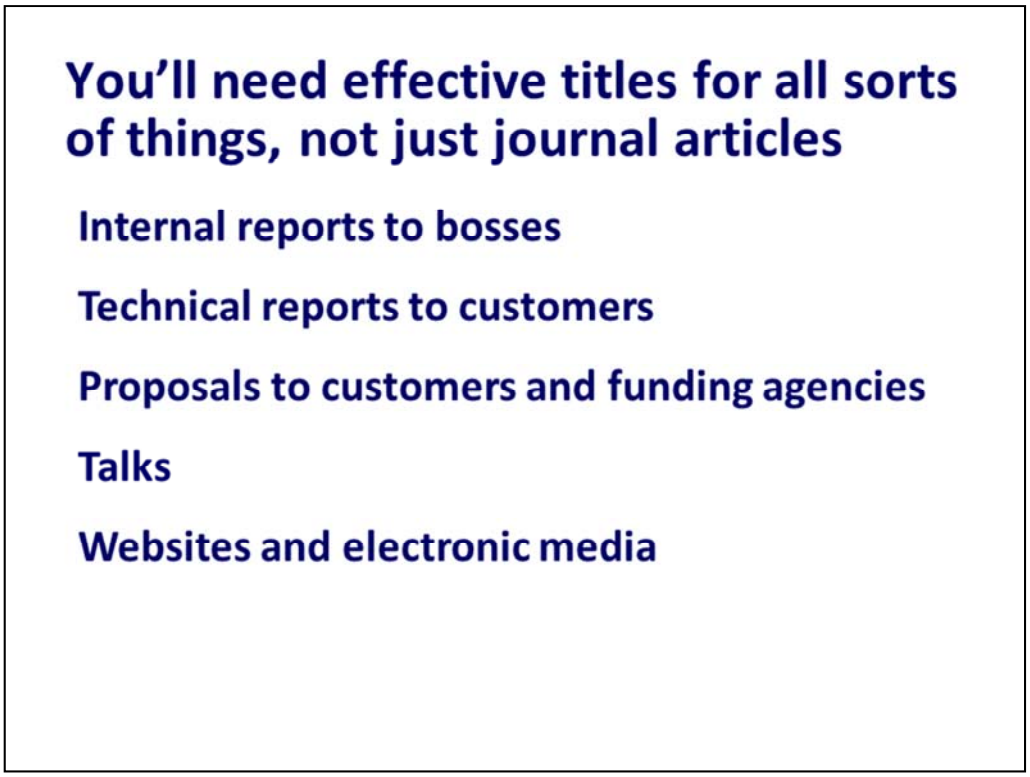
The title is a key element of any form of scientific communication.

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.



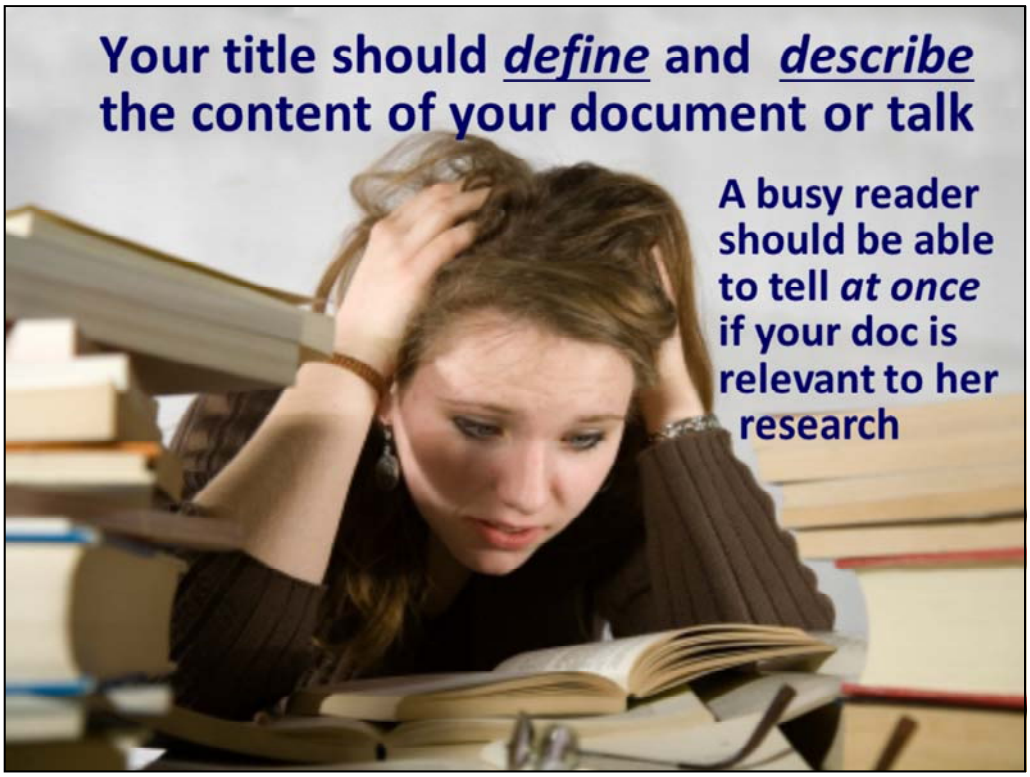
Over the course of your career, you'll write dozens if not hundreds of abstracts, journal papers, technical reports, proposals, press releases, letters, and memos. Every one of them will have a title, which will influence the probability your document will be read and acted upon.

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 decided 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 ≈1 sec to capture their attention.

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

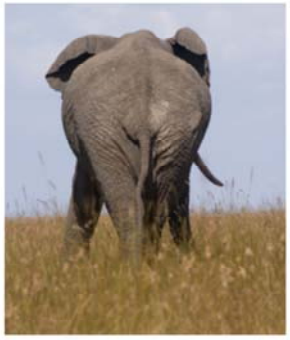
Play fair; don't "trick" people into reading your paper by a misleading title.

Wastes their time.

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

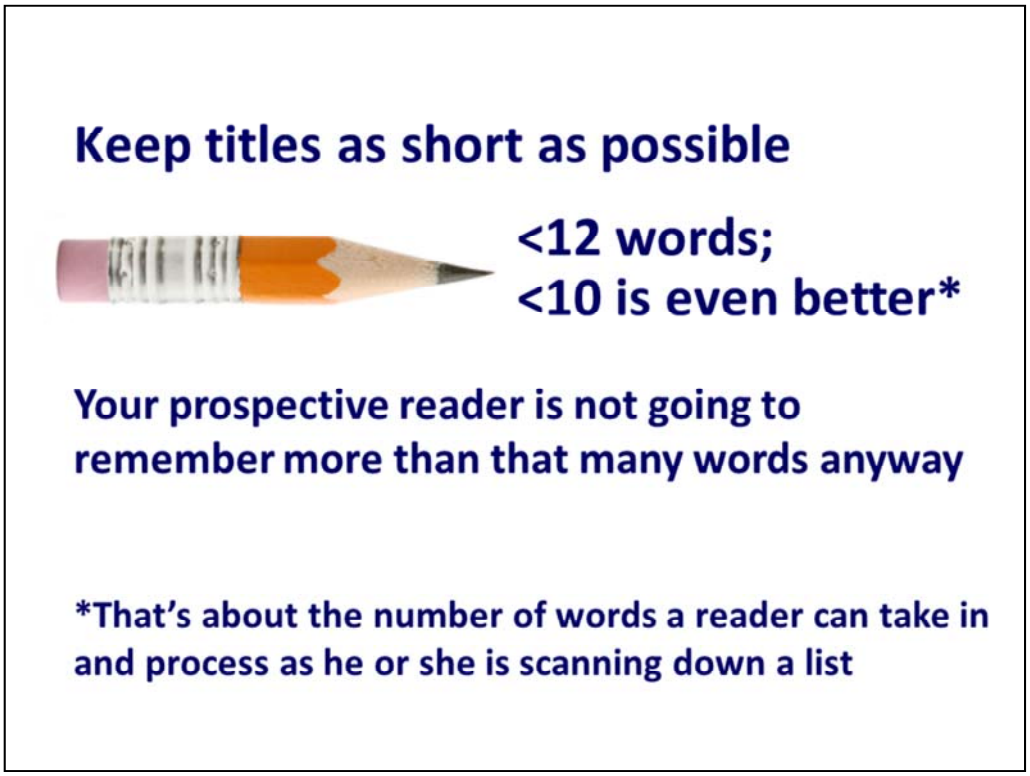
Make it interesting, but not *too interesting...*

"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.



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…")

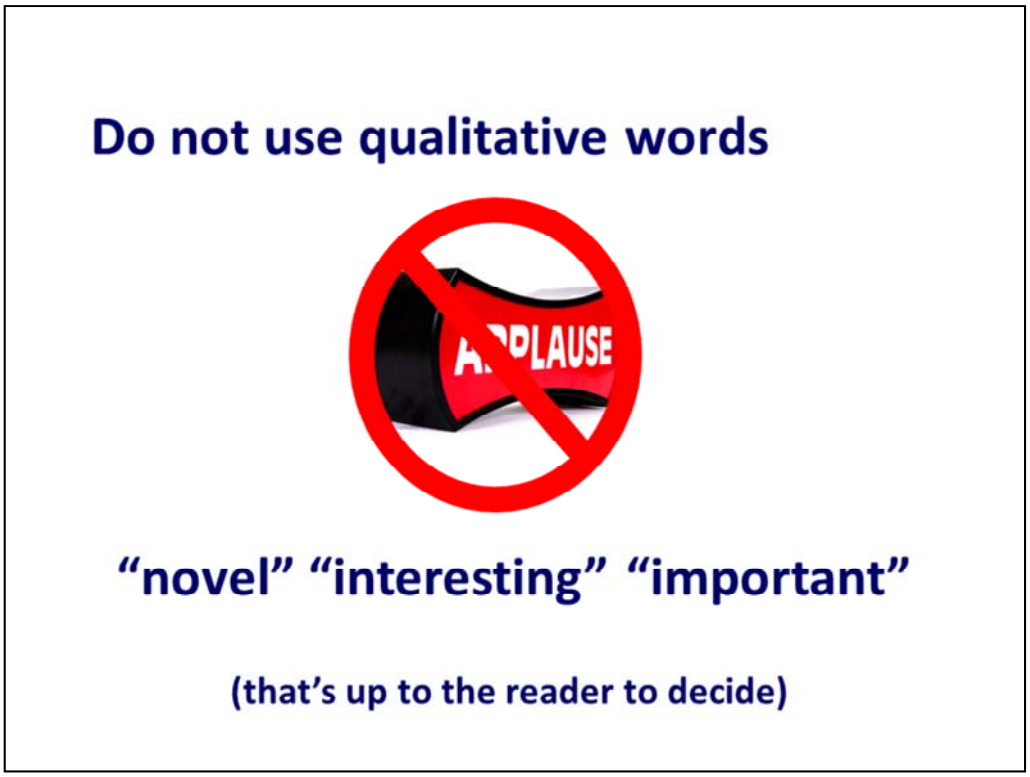
No introductory fluff

~~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 words in the title that make qualitative statements about the work being reported:

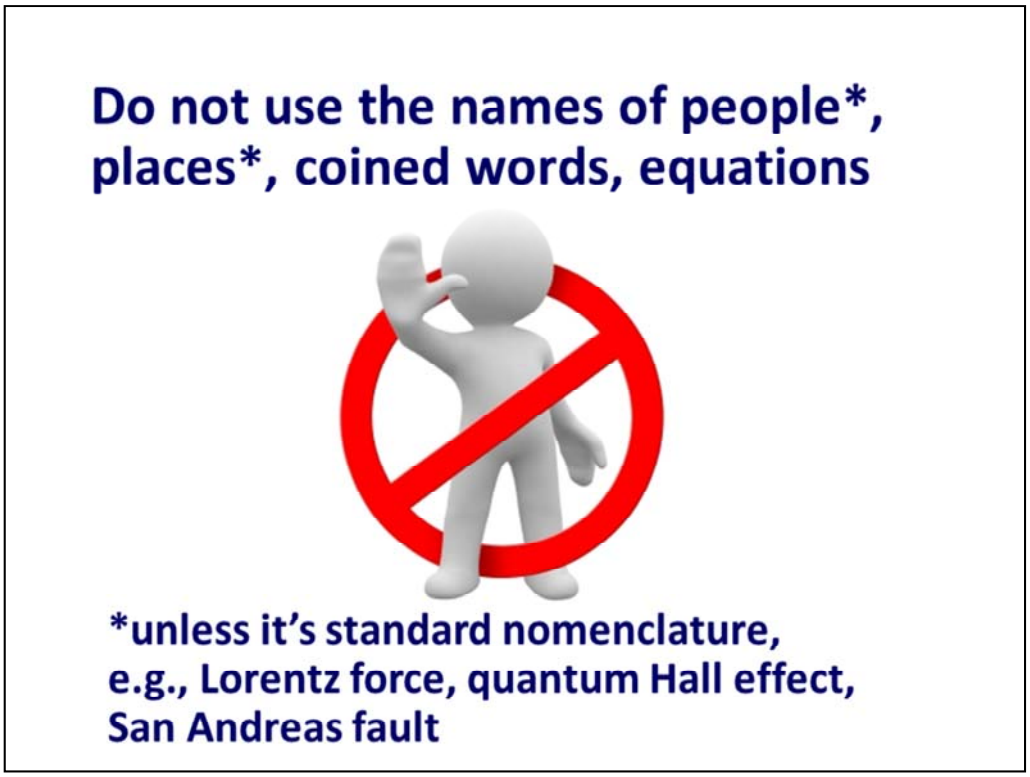
"precise," "accurate"

"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).

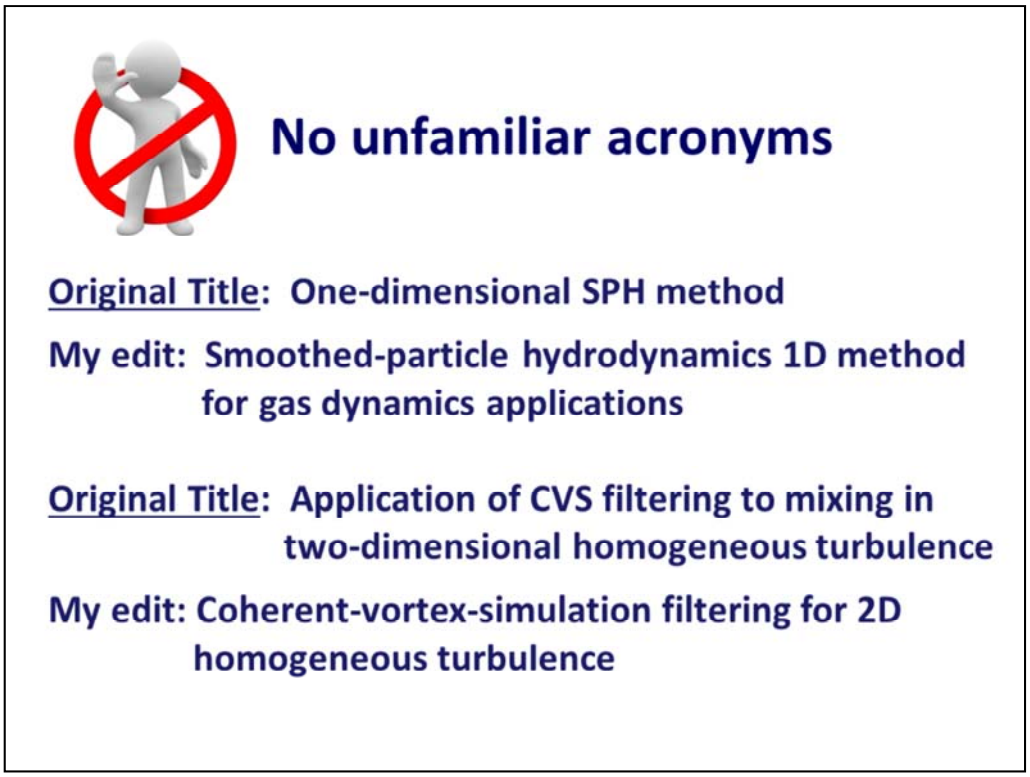


The *Phys. Rev.* journals also proscribe the name of the accelerator or the type of detector used in paper titles (but the particle physicists seem to violate this rule constantly and with impunity—*cme*).

"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 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

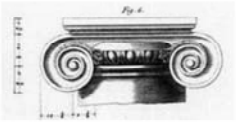
Original Title: One-dimensional SPH method
IMPROVED Title: *Smoothed-particle hydrodynamics 1D method for gas dynamics applications*

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_2"

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 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

"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*

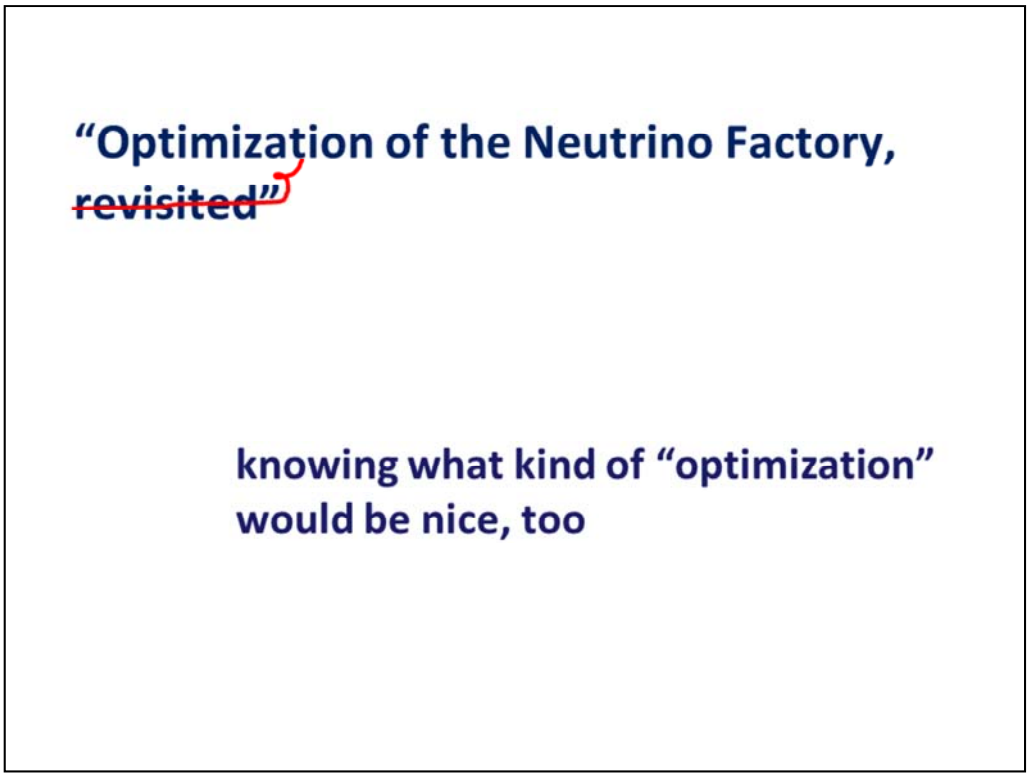
"Pair contact process with diffusion of pairs"

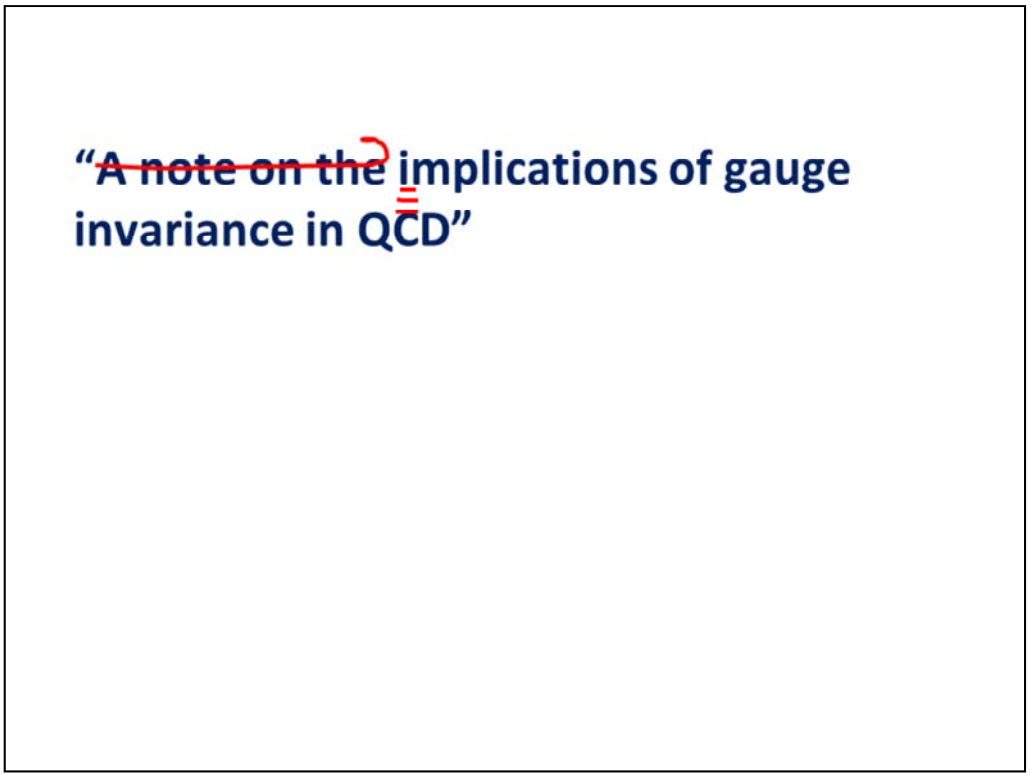
“Pair contact process with diffusion of pairs”

"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





"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)

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