

# Notes on Science Journalism from a Physicist Turned Writer

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<p><b>Physics</b> <b>Our reality seems to be compatible with a quantum multiverse</b> News Subscriber-only</p>	<p><b>Physics</b> <b>Cause and effect may not actually be muddled in the quantum realm</b> News Subscriber-only</p>	<p><b>Chemistry</b> <b>Quantum experiment rewrites a century-old chemistry law</b> News Subscriber-only</p>	<p><b>Technology</b> <b>Ultra-strong stretchy material could enable shape-shifting aircraft</b> News Subscriber-only</p>

**Karmela Padavic-Callaghan, PhD**  
**UIUC, September 2023**

[k.padaviccallaghan@newscientist.com](mailto:k.padaviccallaghan@newscientist.com)

# Outline

1. My past life as a physicist
1. How I got into science journalism
1. How does science journalism “work”
1. Tips on how to engage with journalists

# My work in physics

- BA in Physics and a BS in Math from the University of Chicago
- PhD from University of Illinois Urbana-Champaign CMT and AMO theory
- Three points of focus: novel geometries for BECs, SSH ladders and topology, generalized AAH and quasiperiodicity

Advanced Search

1. arXiv:2007.01393 [pdf, other] [View abstract](#) [View PDF](#) [View PDF](#) [View PDF](#)

**Observation of tunable mobility edges in generalized Aubry-André lattices**  
**Authors:** Prithvi Anir, Karimul Paki, Eric Meier, Sung Heug Lee, Simon Gorenstein, Ji-Hy Park, Jeehoon Vohringer-Klein, Bryan G. Barlow  
**Abstract:** Using synthetic lattices of laser-coupled atoms momentum modes, we experimentally realize a strongly dispersive band of nearest-neighbor tight-binding modes having quasiperiodic site energy modulation that hosts an exact mobility edge protected by a duality symmetry. These one-dimensional tight-binding modes can be viewed as a generalization of the well-known Aubry-André (AA) model, with an inner...  
**Submitted:** 2 July 2020, originally announced July 2020  
**Comments:** 3 pages, 10 figures, arXiv:2007.01393v1 [cond-mat.str-el]  
**Journal ref:** Phys. Rev. Lett. 125, 040501 (2021)

2. arXiv:2005.13030 [pdf, other] [View abstract](#) [View PDF](#) [View PDF](#) [View PDF](#)

**Vortex-antivortex physics in shell-shaped Bose-Einstein condensates**  
**Authors:** Karimul Paki, Sun Sun, Courtney Lambert, Jeehoon Vohringer-Klein  
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**Submitted:** 1 November 2020, v1 submitted 20 May 2020, originally announced May 2020  
**Comments:** 8 pages, 10 figures  
**Journal ref:** Phys. Rev. A 102, 043303 (2020)

3. arXiv:1802.01633 [pdf, other] [View abstract](#) [View PDF](#) [View PDF](#) [View PDF](#)

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**Submitted:** 14 April 2018, v1 submitted 1 February 2018, originally announced February 2018  
**Comments:** 10 pages, 7 figures. Corresponding author: spak@uiowa.edu  
**Journal ref:** Phys. Rev. B 98, 120401 (2018)

4. arXiv:1712.04428 [pdf, other] [View abstract](#) [View PDF](#) [View PDF](#) [View PDF](#)

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**Comments:** 20 pages, 13 figures  
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5. arXiv:1612.05889 [pdf, other] [View abstract](#) [View PDF](#) [View PDF](#) [View PDF](#)

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**Submitted:** 11 January 2016, v1 submitted 17 December 2015, originally announced December 2015  
**Comments:** 8 pages, 4 figures  
**Journal ref:** Phys. Rev. Lett. 116, 030401 (2016)

6. arXiv:1410.0067 [pdf, other] [View abstract](#) [View PDF](#) [View PDF](#) [View PDF](#)

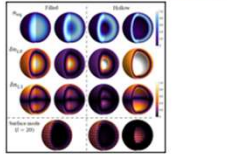
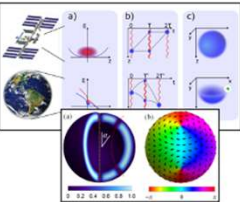
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**Submitted:** 12 October 2014, v1 submitted 10 September 2014, originally announced October 2014  
**Comments:** 14 pages, 12 figures  
**Journal ref:** Phys. Rev. A 91, 033601 (2015)

7. arXiv:1405.8267 [pdf, other] [View abstract](#) [View PDF](#) [View PDF](#) [View PDF](#)

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**Submitted:** 1 June 2014, v1 submitted 11 January 2014, originally announced January 2014  
**Comments:** 8 pages, 2 figures, with included supplementary material  
**Journal ref:** Phys. Rev. Lett. 113, 115301 (2014)

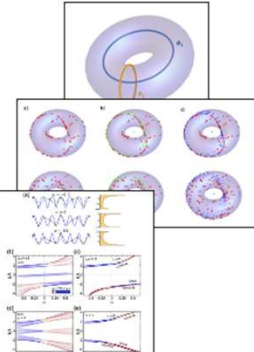
## Overview of Ph. D. Work

Hollow BECs: static and dynamic properties, collective modes, effects of gravity, vortices



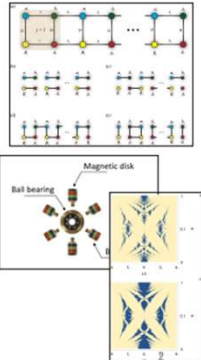
Public et al., PRL 120 (2018), Sun et al., PRA 98 (2018), Frye et al., arXiv:1812.04428, Sun et al., in preparation (2020)

Quasiperiodicity in 1D, transfer matrix methods, toroidal curves, mobility edges, Aubry-André-Harper and related models

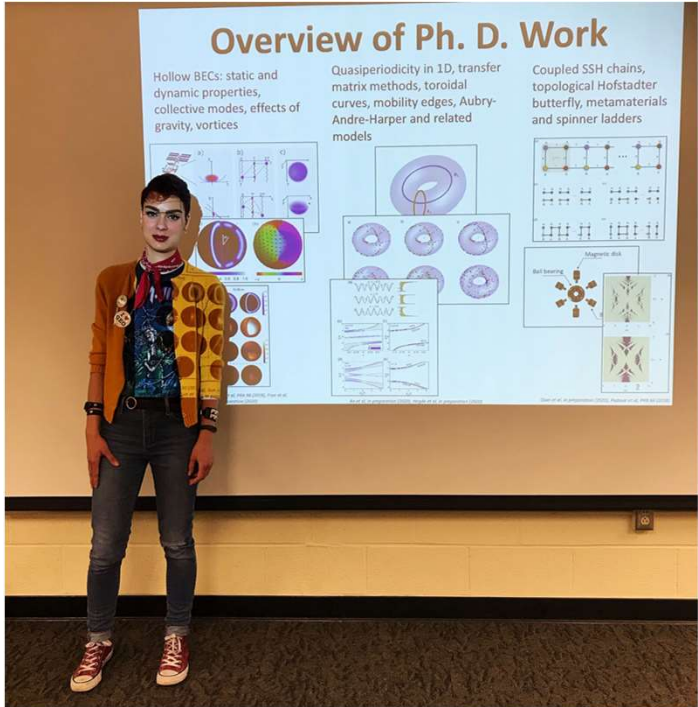


An et al., in preparation (2020), Heugle et al., in preparation (2020)

Coupled SSH chains, topological Hofstadter butterfly, metamaterials and spinner ladders



Qin et al., in preparation (2020), Public et al., PRB 98 (2018)



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Having content expertise in condensed matter physics certainly helped me as a writer but it was not crucial as a good journalist should be able to report on anything. When I was hired at New Scientist they wanted to see my past writing, not my papers. Some of the research I report on is very different than what I did but I believe my experience of being inside academia still helps me here, but more in terms of social norms.

1. arXiv:2007.01393 [pdf, other] [View on arXiv](#) [View on arXiv](#) [View on arXiv](#) [View on arXiv](#)  
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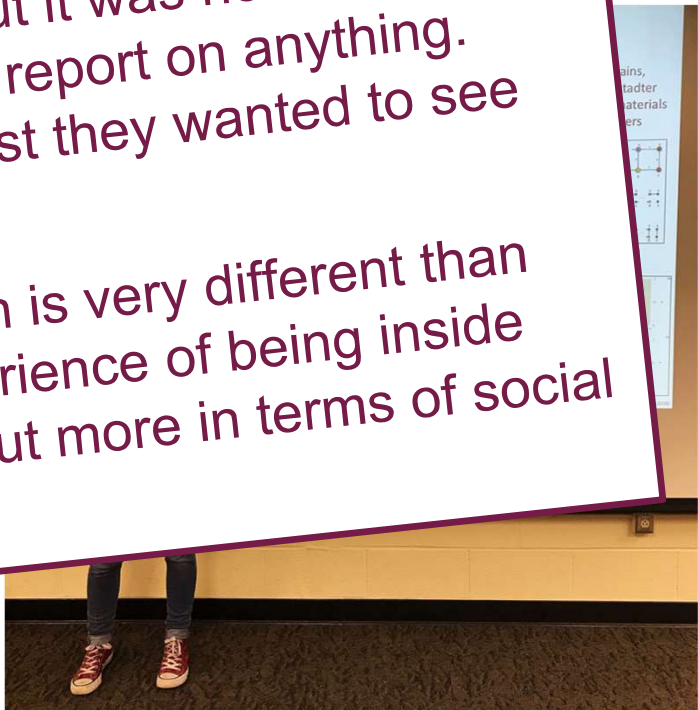
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 Submitted 16 June 2014, v1 submitted 21 January 2014, originally announced January 2014.  
 Comments: 9 pages, 2 figures, with included supplementary material  
 Journal ref: Phys. Rev. Lett. 113, 115701 (2014)

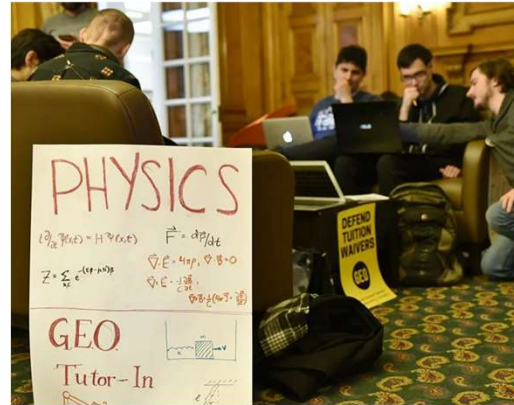
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 Qian et al., in preparation (2020), Public et al., PRB 98 (2018)





# Graduate School Experience

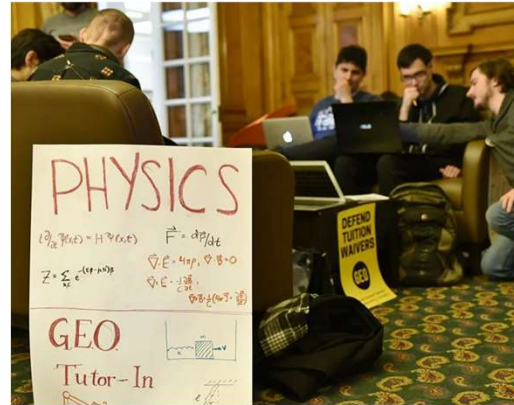
- Mentoring and JEDI work
- Advocacy for women and gender minorities
- Labor organizing for grad workers
- Physics/Art



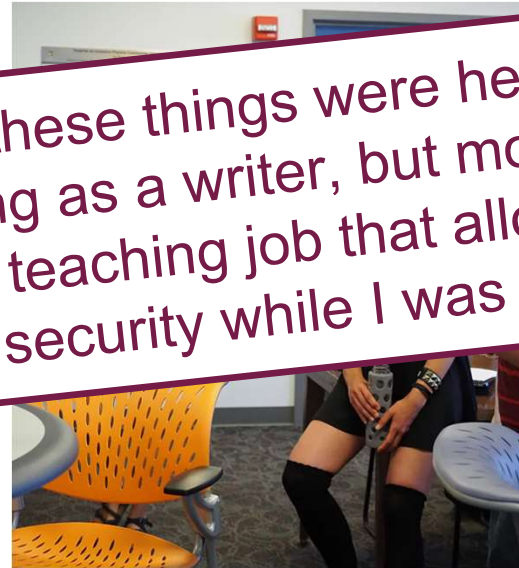


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Some of these things were helpful to me in developing as a writer, but mostly they helped me get a teaching job that allowed me to have financial security while I was writing freelance



## My employer: New Scientist

- Weekly print magazine for science enthusiasts, since 1956 in the UK
- Website updates multiple times a day
- London newsroom + New York newsroom (since 2021)
- Science-only coverage, mostly pegged to peer reviewed journal papers and science events (rocket launches, AI demos...)
- Simple, accessible language + lots of short, to-the-point news stories and a few in-depth features
- Millions of readers globally

# My employer: New Scientist

- Weekly
- the UK
- Website
- London
- Science
- papers
- Simple
- stories
- Millions

The screenshot shows the New Scientist website interface. At the top, the logo 'NewScientist' is on the left, and navigation links for 'Your account', a search bar with the placeholder 'Enter search keywords', and 'Explore our newsletters' are on the right. The main content area features a large article preview for the magazine issue of 21 September 2024. The preview includes the magazine cover with the title 'THE LANGUAGE OF REALITY' and a sub-headline 'Why words obscure the true nature of the universe - and how to see things more clearly'. To the right of the cover are several article teasers categorized by subject: Technology ('Terminator is back, in a striking but flawed anime version'), Physics ('Why the words we use in physics obscure the true nature of reality'), and Health ('Snoring isn't just a nuisance, it's dangerous. Why can't we treat it?'). At the bottom of the preview area, there are two buttons: 'Read the latest issue' and 'See past issues', both with right-pointing arrows.

**NewScientist** Your account

**This week's magazine**  
21 September 2024

**New Scientist**  
WEEKLY 21 September 2024

**THE LANGUAGE OF REALITY**  
Why words obscure the true nature of the universe - and how to see things more clearly

**WHY SNORING IS A NIGHTMARE FOR YOUR HEALTH**  
**THE NEANDERTHAL TRIBE ISOLATED FOR MILLENNIA**  
**WE FINALLY KNOW WHAT PREGNANCY REALLY DOES TO THE BRAIN**

**Technology**  
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**Health**  
**Snoring isn't just a nuisance, it's dangerous. Why can't we treat it?**

**Technology**  
**The AI expert who says artificial general intelligence is nonsense**

**PLUS** BRAIN SCAN HATS FOR CATS  
**THE TERMINATOR IS BACK - AGAIN**  
DOES QUANTUM MECHANICS BREAK TIME?  
IS IT REALLY CHEAPER TO GROW YOUR OWN VEG?

Read the latest issue →  
See past issues →



# Science journalism vs. science communication?

- Science communicators set out to explain and educate, sometimes about very recent research, sometimes about general or fundamental topics
- Science journalism is more timely and can be more critical .... because it's journalism!
  - A journalist's job is not so much to educate as much as to **report facts** in a **timely manner** as **objectively** as possible (if someone says a paper is bad on record, we print that!) and with enough context for a non-scientist to quickly grasp the significance of the work
  - Journalists have "beats" which are sort of like subject areas but rarely write about a topic and almost always write about an event, whether it's work that was just published or a technology that was just demonstrated
- Science communicators are often scientists themselves, many science journalists are not - they went to journalism school (typically an MA degree)

# How did I get into science journalism?

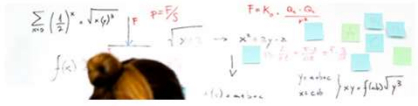
- I've done some sort of personal writing almost all my life, so I started with a strong writing practice (but being a writer is different from being a journalist)
- The Xylom + ComSciCon-AIP + Science Talk + Massive Science + a whole lot of networking
- Opinion piece in Scientific American (workshopped at ComSciCon-AIP, help with pitching)
- Public information (comms) work at UIUC
- More networking through various Slack channels and Facebook groups (mostly to get editors emails)
- Started pitching to magazines: Scientific American, WIRED, Quanta, Slate, Aeon, MIT Technology Review, Physics World...
- Joined National Association of Science Writers + support group for early career science writers that meets in-person in New York City
- Offered a full time position at New Scientist as a Physics Reporter on the news desk (good enough to leave my job teaching high school!)

# Freelance work: more freedom to choose topics, way less financial stability

## Women Have Been Disappearing From Science for As Long As They've Been Allowed to Study Science

In the early 1900s, Harriet Brooks made groundbreaking contributions to physics—before she got married and had to quit the field.

BY KARMELO PADOVIC-CALLAGHAN AND HOSSEIN TAHERI MAY 02, 2022 • 5:50 AM



## Fast quantum random number generator could advance cryptography on the cheap

09 Dec 2020

## Deborah Jin engineered new quantum states of matter — twice

According to colleague Kathryn J. Levin, Jin "probably would have gotten the Nobel!"

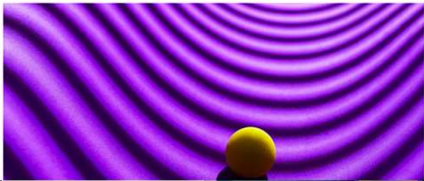
Karmela Padavic-Callaghan  
Theoretical Physics  
University of Illinois at Urbana-Champaign

## To See Proteins Change in Quadrillionths of a Second, Use AI

Researchers have long wanted to capture how protein structures contort in response to light. But getting a clear image was impossible—until now.

## Defects may help scientists understand the exotic physics of topology

WRITTEN BY KARMELO PADOVIC-CALLAGHAN



## Imaginary numbers are real

These odd values were long dismissed as bookkeeping. Now physicists are proving that they describe the hidden shape of nature.

## This startup wants to make electronics out of single molecules

Twenty years after the field underwent a dramatic hype cycle, Roswell Biotechnologies is using single molecules to make better biosensor chips.

By Karmela Padavic-Callaghan March 31, 2022

## Ultracold Molecule Mystery Solved

Lasers slow molecules for a glimpse of the quantum world—and a strange heating is uncovered

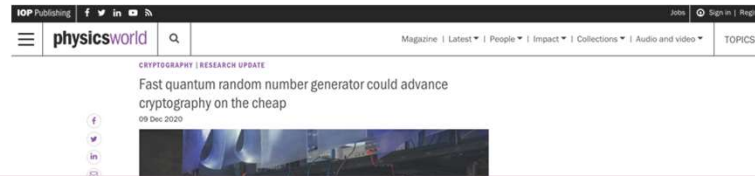
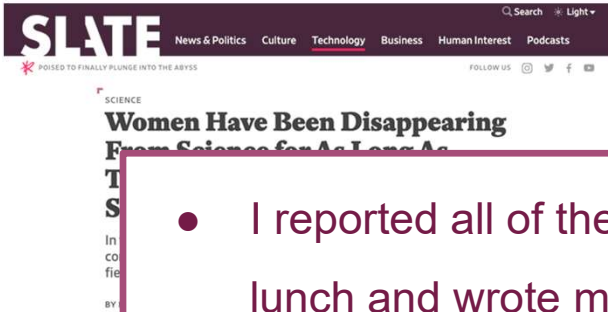
By Karmela Padavic-Callaghan on December 1, 2020

## Physicists Create a Bizarre 'Wigner Crystal' Made Purely of Electrons

The unmistakable discovery of a Wigner crystal relied on a novel technique for probing the insides of complex materials.



# Freelance work: more freedom to choose topics, way less financial stability



- I reported all of these stories while teaching full-time. I did interviews after hours or during lunch and wrote mostly at night.
- For freelance work you send an editor at a magazine that seems like a good fit for the story a pitch, sort of like a condensed proposal
- If they get back to you at all, they can pass or commission a story, sometimes at a different length or angle than you suggested, and they set a timeline
- Ideal pay is 1\$/word but this is less and less common, most magazines will offer between 400 and 1200 word stories to young writers
- Most pitches are rejected + many editors won't reply to a cold pitch email if they don't know you already (it helps if your story is very in-demand or very unique and hard to cover)



## Working as a Staff Writer (on the news desk)

- I pitch up to five stories every day (I cover all physics that's not astro or HEP), these are less formal pitches but to generate them I have to read a lot:
  - recent and accepted pages of Physical Review journals (PRL, PRA, PRB, PRE, PRF, PRXs..)
  - ACS journals
  - press lists and press releases from Science and Nature family of journals
  - press releases from universities and startups
  - arXiv
  - conference programs and talks
  - Twitter
- My editor commissions stories based on pitches and they set the word count and the timeline (usually two or three days). They commission based on a provisional headline but in the end they will write the official headline (and it's almost always different, because of SEO)
- The expectation is that I'll pitch, report and finish 3-5 stories a week (1500ish words)

## Working as a Staff Writer (on the news desk)

- Reporting means:
  - reading the paper
  - interviewing the authors
  - interviewing another scientist from the field for outside comment
- I file a draft (“copy”) with an editor who then has final say over what makes it online or into print. Sometimes they make aesthetic changes only, sometimes they re-order and re-write paragraphs, sometimes they return copy with questions and ask for a re-write
- *This part of the process is almost exactly the same for freelancers!*



## Ok, but how do I get into this?

- Go to journalism school (science journalism programs at NYU, CUNY, UCSB, MIT...)
- Get an AAAS Mass Media Science & Engineering Fellowship
- Get involved with comms in your department
- Write for your university's paper
- Pitch opinion pieces to magazines (warning: this is not reporting/journalism, but it can open doors)
- Freelance (but get ready for lots of rejection and have good savings going in)

# What makes for a good story?

- Firsts, mosts and other superlatives
- Work that says something new about most fundamental fundamentals
- Stories with very good visuals
- News-you-can-use
- “Wow you’ll never believe this” stories or stories that pass the “pub test”  
(would you tell your friends about reading this story at the pub after work?)
- A paper that cannot be summarized in one plain English sentence is unlikely to make it past an editor (though I still pitch these sometimes)

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**For news and stories based on single studies, it should be unambiguously clear to the reader why the story is interesting and worth writing about even if they don't know anything about the subject**

- A paper that can be summarized in one plain English sentence is

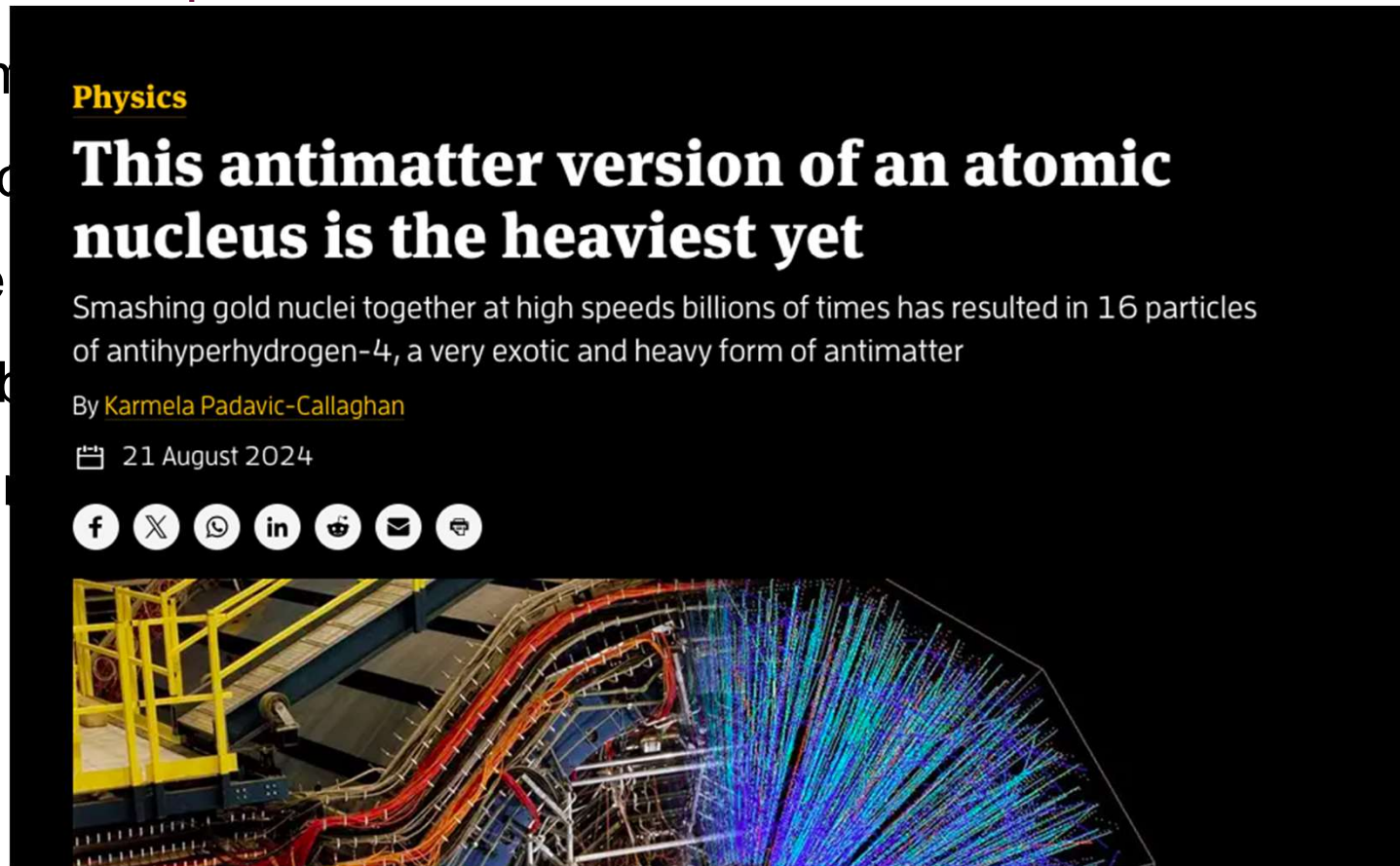
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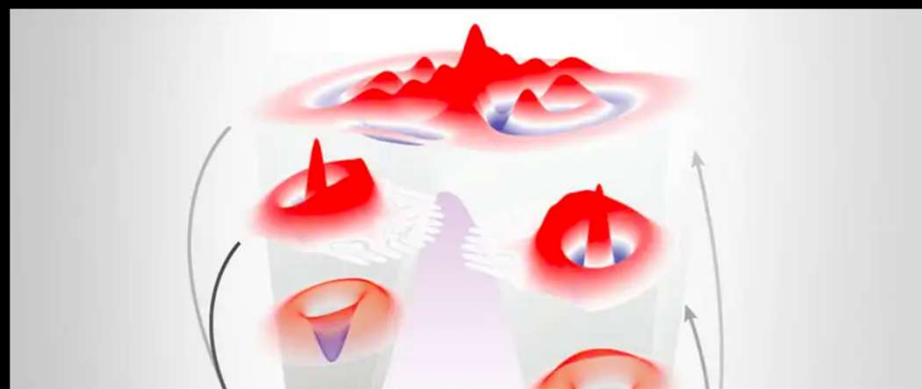
Chemistry

## Quantum experiment rewrites a century-old chemistry law

The Arrhenius equation, which has accurately described rates of chemical reactions for more than a century, may have to be tweaked for the quantum realm

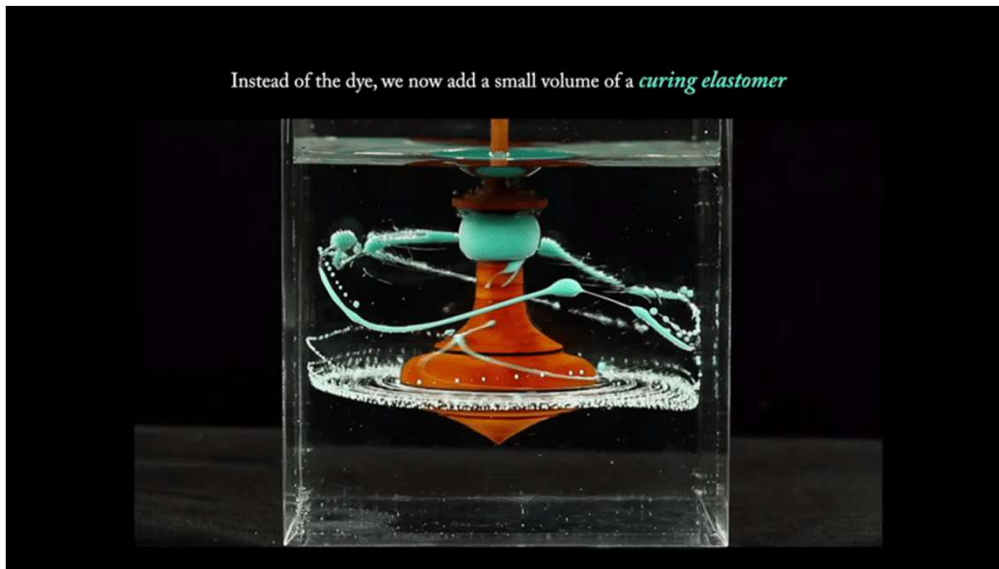
By Karmela Padavic-Callaghan

9 September 2024



# What makes for a good story?

- Firsts, mosts and other superlatives
- Work that says something new about most fundamental fundamentals
- Stories with very good visuals
- News-you-can-use



**Physics**

## Spectacular liquid fractal generated by a submerged spinning top

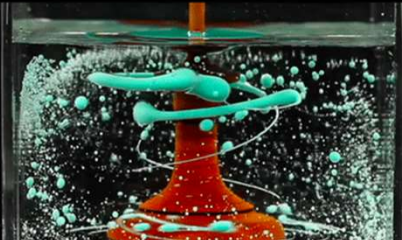
A spinning top submerged in a liquid mixture generates a fractal – a pattern that repeats itself at smaller scales

By [Karmela Padavic-Callaghan](#)

📅 12 December 2022

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Instead of the dye, we now add a small volume of a *curing elastomer*

A photograph showing a spinning top submerged in a liquid mixture. The top is orange and is spinning, creating a complex, fractal-like pattern of white and blue lines and dots in the liquid. The background is dark, making the liquid and the top stand out.

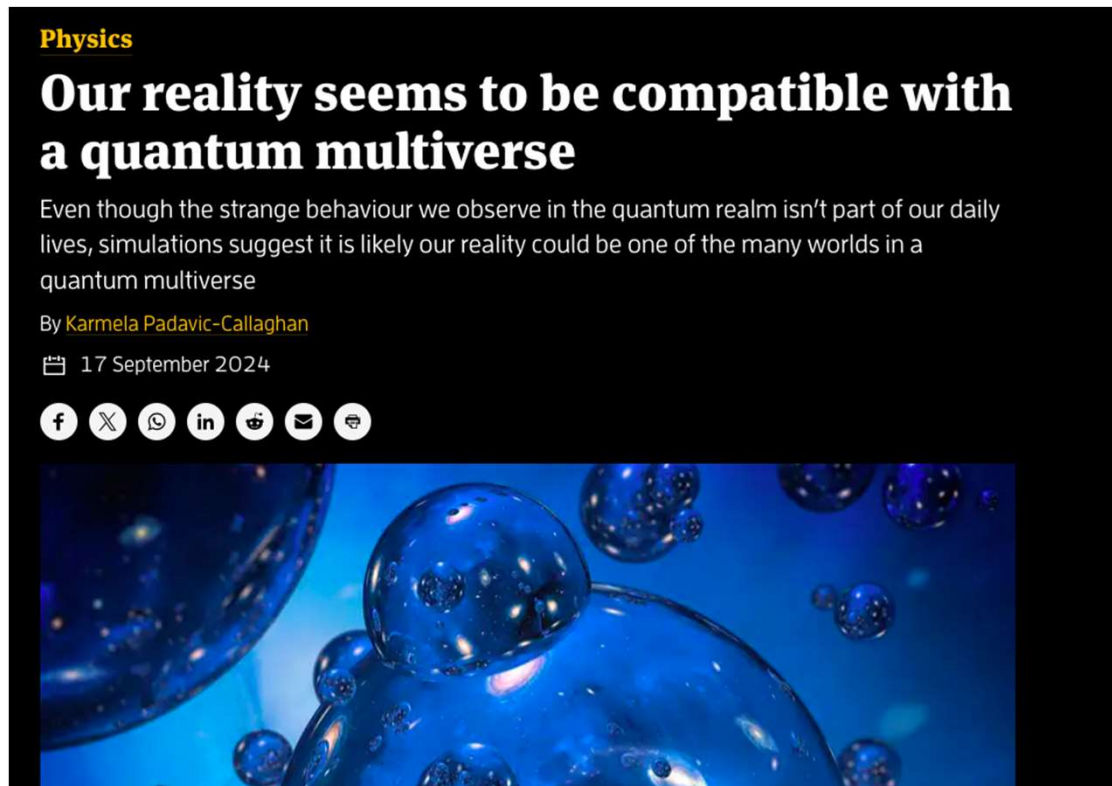
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- Firsts, mosts and other superlatives
- Work that says something new about most fundamental fundamentals
- Stories with very good visuals
- News-you-can-use
- “Wow you’ll never believe this” stories or stories that pass the “pub test” (would you tell your friends about reading this story at the pub after work?)





**How to engage with journalists?**

# I think some of my work could lead to good stories but...

- It hasn't been published in a high profile journal
  - This often does not actually matter, Nature and Science papers get more traction with media because the journals themselves send them to people like me, but journalists rarely discriminate

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- I'm not on Twitter and don't have a website
  - As long as your work is out there this isn't necessarily a problem (but if you want media to come to you more often it may be worth considering these things, especially if your work produces lots of visuals that will catch an eye of someone that is mindlessly scrolling)

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- I hate the idea of reaching out to strangers
  - Does your department have a PIO or a Comms person? They already write press releases and can help with publicising work. Many will email journalists directly or use a service that makes PR materials available to journalists.



# **A journalist thinks my work would make for a good story, now what?**

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- But I'm worried about how the journal will react
  - If the paper has been accepted to a journal, the journal will communicate if there is embargo and if there is one, journalist will respect that
  - If the paper is under review or hasn't been submitted yet but is on a preprint server, you're fine
  - If you're not sure you can always reach out to the journal and have them look at the journalist's request and information

# A journalist thinks my work would make for a good story, now what?

- Look up the publication they work for, if it seems serious enough you probably should
- But I'm worried about how the journal will react
- But they say they won't show me a draft of the article
  - If they do show you the draft you should be worried! Journalism is all about objectivity and independence, you as the subject of the story should not be able to make big changes (imagine if this happened in politics journalism)
  - You can ask to see your quotes or, during the interview, ask the journalists to walk you through what they think the structure and punchlines of the story will be

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- Look up the publication they work for, if it seems serious enough you probably should
- But I'm worried about how the journal will react
- But they say they won't show me a draft of the article
- But I don't think this result is actually that big of a deal
  - Say this in the interview, but do also acknowledge that someone who writes stories for a living (and their editors) think your work is awesome

# A journalist thinks my work would make for a good story, now what?

- What happens if I don't talk to them?
  - If the paper has been accepted to a Nature or Science family of journals, journalists can access them through the journals' press site and might write about it anyway
  - If the paper is on the arXiv, it's in the public domain and the journalists might write about it anyway

... if you're worried about your work being covered accurately, your best bet is to engage with folks that are covering it in some capacity



## Interview tips

- The biggest lift for the writer is explaining why a study/paper/experiment is important or interesting at all. The reader rarely has knowledge of past work, trends in the field or what is even standard for some subgenre of research. Start broad and try to give lots of context first.
- Technical language and process details are really hard. Stories have to include a section that describes what was done (“*The researchers started by.... Then they...*”) but expect that section to be simplified and shortened or to rely on analogy. Most words that need to be defined for the reader typically get edited out. (Editor’s can be brutal about this!)

## Interview tips ctd.

- This varies, but it's probably better to assume that the writer doesn't have 1000s of words and will have to leave out really interesting parts of your interview in favor of other really interesting parts. It's never personal.
  - At New Scientist's news run at 400-700 words, most other magazine commission at 800-1200 unless the story is a feature that features many scientists
- Breaking news and embargoed stories have to be turned around quickly so being willing to find time for an interview on a short notice and being able to speak to the point is something writers value immensely
- It's always ok to ask how long a story will be or who the magazine's targeted audience is - in fact you should consider always doing it just like you might consider asking what you may be quoted as saying

## Interview tips ctd.

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  - At New Scientist's news run at 400-700 words, most other magazines are 1200 words unless the story is a feature that features many scientists.
- Breaking news and embargoes. Be willing to find a way to speak to the audience.
- It's always good to consider asking the magazine's targeted audience is who you want to be quoted as saying.

**This all still holds even if you're being asked for comment and the story is not about one of your papers. Often, outside commenters help the writer contextualize and understand the work much better than their primary sources/authors**

## Once the story is out: corrections and “surprises”

- Headlines and subheadlines for articles are almost never up to the writer and get set during the editing process. There's a lot that goes into titles, mostly SEO considerations and “buzziness”, so the article about your paper may not have a title that is very similar, or similar at all, to the paper's title
- Magazine editors are different from editors in peer reviewed journals in that they make more serious changes, from adjusting language to shuffling paragraph order to cutting quotes. If you see parts of a draft before publication, the published version that's gone through editing will likely differ
- In almost all cases, changes that have to be made after publication, whether they be corrections of fact or other tweaks, have to be done by the editor. The writer can mediate but they will rarely actually be able to help you.

## Once the story is out: sharing and following up

- Sometimes writers will let you know when a story has been published and sometimes they will not, if they don't it's very likely not personal and they're just busy (I interview 9-12 people most weeks, often I don't get around following up with all of them)
  - You may want to set up a Google Alert for your name if you want to be pinged the second a story is up
- Magazines share stories across socials, often repeatedly, but you can for sure share too + add it to your website
- Don't be shy about following up with the journalist the next time you have a paper - some of my best and favorite stories came from researches I spoke to once sending me an early copy of their next paper.



**Thank you and please  
do ask questions!**