


Astrobites: beyond seven years of astro-blogging

Benny Tsang

Feb 23 GSPS



Experience with Astrobites
+
Rambling on science communication

A decorative graphic in the bottom-left corner consisting of several overlapping diagonal lines in blue and black, extending from the bottom-left towards the top-left.

Let's think back in time

A NEW MONTE CARLO METHOD FOR TIME-DEPENDENT NEUTRINO RADIATION TRANSPORT

ERNAZAR ABDIKAMALOV¹, ADAM BURROWS², CHRISTIAN D. OTT^{1,3,4,8}, FRANK LÖFFLER⁴,
EVAN O'CONNOR¹, JOSHUA C. DOLENCE², AND ERIK SCHNETTER^{4,5,6,7}¹ TAPIR, California Institute of Technology, MC 350-17, 1200 E California Blvd., Pasadena, CA 91125, USA; abdik@tapir.caltech.edu² Department of Astrophysical Sciences, Princeton University, Peyton Hall, Ivy Lane, Princeton, NJ 08544, USA³ Kavli Institute for the Physics and Mathematics of the Universe, Todai Institutes for Advanced Study, the University of Tokyo, Kashiwa, Japan 277-8583 (Kavli IPMU, WPI)⁴ Center for Computation & Technology, Louisiana State University, 216 Johnston Hall, Baton Rouge, LA 70803, USA⁵ Perimeter Institute for Theoretical Physics, Waterloo, ON, Canada⁶ Department of Physics, University of Guelph, Guelph, ON, Canada⁷ Department of Physics & Astronomy, Louisiana State University, Baton Rouge, LA 70803, USA*Received 2012 March 13; accepted 2012 June 21; published 2012 August 1*

ABSTRACT

Monte Carlo approaches to radiation transport have several attractive properties such as simplicity of implementation, high accuracy, and good parallel scaling. Moreover, Monte Carlo methods can handle complicated geometries and are relatively easy to extend to multiple spatial dimensions, which makes them potentially interesting in modeling complex multi-dimensional astrophysical phenomena such as core-collapse supernovae. The aim of this paper is to explore Monte Carlo methods for modeling neutrino transport in core-collapse supernovae. We generalize the Implicit Monte Carlo photon transport scheme of Fleck & Cummings and gray discrete-diffusion scheme of Densmore et al. to energy-, time-, and velocity-dependent neutrino transport. Using our 1D spherically-symmetric implementation, we show that, similar to the photon transport case, the implicit scheme enables significantly larger timesteps compared with explicit time discretization, without sacrificing accuracy, while the discrete-diffusion method leads to significant speed-ups at high optical depth. Our results suggest that a combination of spectral, velocity-dependent, Implicit Monte Carlo and discrete-diffusion Monte Carlo methods represents a robust approach for use in neutrino transport calculations in core-collapse supernovae. Our velocity-dependent scheme can easily be adapted to photon transport.

Key words: hydrodynamics – neutrinos – radiative transfer – stars: evolution – stars: neutron – supernovae: general

Online-only material: color figures

A NEW MONTE CARLO METHOD FOR TIME-DEPENDENT NEUTRINO RADIATION TRANSPORT

ERNAZAR ABDIKAMALOV¹, ADAM BURROWS², CHRISTIAN D. OTT^{1,3,4,8}, FRANK LÖFFLER⁴,EVAN O'CONNOR¹, JOSHUA C. DOLENCE², AND ERIK SCHNETTER^{4,5,6,7}¹ TAPIR, California Institute of Technology, MC 350-17, 1200 E California Blvd., Pasadena, CA 91125, USA; abdik@tapir.caltech.edu² Department of Astrophysical Sciences, Princeton University, Peyton Hall, Ivy Lane, Princeton, NJ 08544, USA³ Kavli Institute for the Physics and Mathematics of the Universe, Todai Institutes for Advanced Study, the University of Tokyo, Kashiwa, Japan 277-8583 (Kavli IPMU, WPI)⁴ Center for Computation & Technology, Louisiana State University, 216 Johnston Hall, Baton Rouge, LA 70803, USA⁵ Perimeter Institute for Theoretical Physics, Waterloo, ON, Canada⁶ Department of Physics, University of Guelph, Guelph, ON, Canada⁷ Department of Physics & Astronomy, Louisiana State University, Baton Rouge, LA 70803, USA*Received 2012 March 13; accepted 2012 June 21; published 2012 August 1*

ABSTRACT

Monte Carlo approaches to radiation transport have several attractive properties such as simplicity of implementation, high accuracy, and good parallel scaling. Moreover, Monte Carlo methods can handle complicated geometries and are relatively easy to extend to multiple spatial dimensions, which makes them potentially interesting in modeling complex multi-dimensional astrophysical phenomena such as core-collapse supernovae. The aim of this paper is to explore Monte Carlo methods for modeling neutrino transport in core-collapse supernovae. We generalize the Implicit Monte Carlo photon transport scheme of Fleck & Cummings and gray discrete-diffusion scheme of Densmore et al. to energy-, time-, and velocity-dependent neutrino transport. Using our 1D spherically-symmetric implementation, we show that, similar to the photon transport case, the implicit scheme enables significantly larger timesteps compared with explicit time discretization, without sacrificing accuracy, while the discrete-diffusion method leads to significant speed-ups at high optical depth. Our results suggest that a combination of spectral, velocity-dependent, Implicit Monte Carlo and discrete-diffusion Monte Carlo methods represents a robust approach for use in neutrino transport calculations in core-collapse supernovae. Our velocity-dependent scheme can easily be adapted to photon transport.

Key words: hydrodynamics – neutrinos – radiative transfer – stars: evolution – stars: neutron – supernovae: general

Online-only material: color figures

Astrobites: Digestible astronomy research



About ▾ Latest Research ▾ Beyond astro-ph ▾ Guides ▾ 🔍

Featured Astrobites

Our latest posts



THE ASTROPHYSICAL JOURNAL, 755:111 (28pp), 2012 August 20
© 2012. The American Astronomical Society. All rights reserved. Printed in the U.S.A.

doi:10.1088/0004-637X/755/2/111

A NEW MONTE CARLO METHOD FOR TIME-DEPENDENT NEUTRINO RADIATION TRANSPORT

ERNAZAR ABDIKAMALOV¹, ADAM BURROWS², CHRISTIAN D. OTT^{1,3,4,8}, FRANK LÖFFLER⁴,

EVAN O'CONNOR¹, JOSHUA C. DOLENCE², AND ERIK SCHNETTER^{4,5,6,7}

¹ TAPIR, California Institute of Technology, MC 350-17, 1200 E California Blvd., Pasadena, CA 91125, USA; abdik@tapir.caltech.edu

² Department of Astrophysical Sciences, Princeton University, Peyton Hall, Ivy Lane, Princeton, NJ 08544, USA

³ Kavli Institute for the Physics and Mathematics of the Universe, Todai Institutes for Advanced Study, the University of Tokyo,

Kashiwa, Japan 277-8583 (Kavli IPMU, WPI)

⁴ Center for Computation & Technology, Louisiana State University, 216 Johnston Hall, Baton Rouge, LA 70803, USA

⁵ Perimeter Institute for Theoretical Physics, Waterloo, ON, Canada

⁶ Department of Physics, University of Guelph, Guelph, ON, Canada

⁷ Department of Physics & Astronomy, Louisiana State University, Baton Rouge, LA 70803, USA

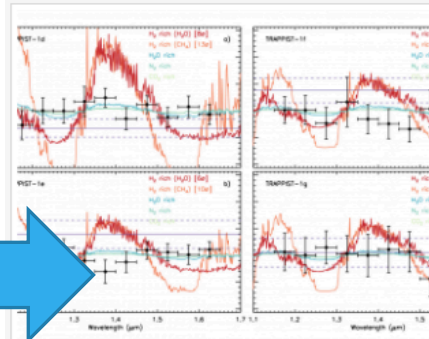
Received 2012 March 13; accepted 2012 June 21; published 2012 August 1

ABSTRACT

Monte Carlo approaches to radiation transport have several attractive properties such as simplicity of implementation, high accuracy, and good parallel scaling. Moreover, Monte Carlo methods can handle complicated geometries and are relatively easy to extend to multiple spatial dimensions, which makes them potentially interesting in modeling complex multi-dimensional astrophysical phenomena such as core-collapse supernovae. The aim of this paper is to explore Monte Carlo methods for modeling neutrino transport in core-collapse supernovae. We generalize the Implicit Monte Carlo photon transport scheme of Fleck & Cummings and gray discrete-diffusion scheme of Densmore et al. to energy-, time-, and velocity-dependent neutrino transport. Using our 1D spherically-symmetric implementation, we show that, similar to the photon transport case, the implicit scheme enables significantly larger timesteps compared with explicit time discretization, without sacrificing accuracy, while the discrete-diffusion method leads to significant speed-ups at high optical depth. Our results suggest that a combination of spectral, velocity-dependent, Implicit Monte Carlo and discrete-diffusion Monte Carlo methods represents a robust approach for use in neutrino transport calculations in core-collapse supernovae. Our velocity-dependent scheme can easily be adapted to photon transport.

Key words: hydrodynamics – neutrinos – radiative transfer – stars: evolution – stars: neutron – supernovae: general

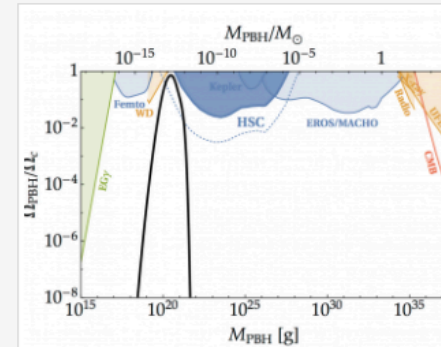
Online-only material: color figures



TRAPPIST-1: Atmospheric Recon

by Mara Zimmerman | Feb 14, 2018

Researchers took observations using the Hubble Space Telescope to find out more about the atmospheric compositions of the Earth-sized exoplanets in the Habitable Zone of TRAPPIST 1.



(Just can't get enough) primordial black holes

by Philippa Cole | Feb 13, 2018

The authors show that it's possible to produce enough asteroid-mass primordial black holes to make them a viable dark matter candidate, without violating the new and very stringent constraints on the

warm Jupiters with JWST.





Anson Lam
UCLA



Ashley Villar
Harvard



Ben Cook
Harvard



Samuel Factor
U. TX Austin



Caroline Huang
Johns Hopkins



Christopher
Lovell
U. of Sussex



David Wilson
U. of Warwick



Elisabeth
Matthews
U. of Exeter



Gourav Khullar
U. of Chicago



Gudmundur
Stefansson
Penn State



Ingrid Pelisoli
U. Federal do Rio
Grande do Sul



Jesse Feddersen
Yale



Joanna Bridge
Penn State



Joseph Schmitt
Yale



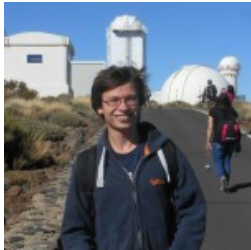
Kelly Malone
Penn State



Leonardo dos
Santos
U. of Sao Paulo



Mara Johnson-
Groh
U. of Victoria



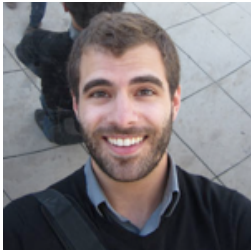
Matthew Green
U. of Warwick



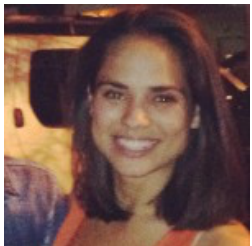
Michael Hammer
U. of Arizona



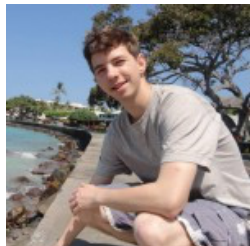
Michael Küffmeier
U. of Copenhagen



Michael Zevin
Northwestern



Natasha Batalha
Penn State



Paddy Alton
Durham U.



Stacy Kim
Ohio State



Steph Greis
U. Of Warwick



Suk Sien Tie
Ohio State



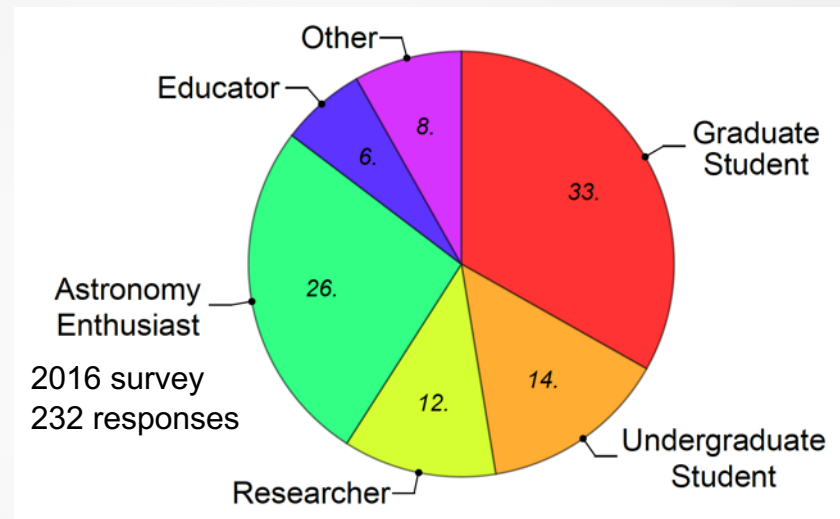
Tim Lichtenberg
ETH Zurich



Zephyr Penoyre
Columbia

The Astrobites Philosophy

- Educational resource for undergrads (and grad students, scientists, public...)
- Professional development for grads
- Model for scientific writing collaboration



Astrobites en español

NOTICIAS ASTRONÓMICAS



oceanbites

THE LATEST OCEANOGRAPHY LITERATURE, EXPLAINED

particlebites

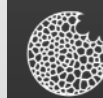
THE HIGH ENERGY PHYSICS READER'S DIGEST

EVO BITES

Evolutionary Biology in bite-sized pieces



Chembits



SOFTBITES

A softer side of science

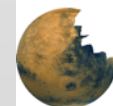


envirobites

environmental science research for everyone

اسطرلاب
staryab.com

Staryab is an astrophysical literature website written in Farsi.



astrobites

THE ASTRO-PH READER'S DIGEST

Publishing achievements – first 7 years

- 1800+ daily paper summaries
- 200 career navigation and personal experience posts
- > 40 undergraduate research projects highlighted
- ~3 million pageviews since inception
- 4000+ active weekly readers

A week in the life of an astronomy postgrad researcher – more average than you might think?

by Amber Hornsby | Feb 16, 2018 | Personal Experiences | 0 comments

As part of the Astronomical Society's week-long activities are so much more than just modelling and measuring future observations or time soldering, chasir Sanders' "A day in the life of an astronomy postgrad researcher (grad student)

Monday

Arriving at work just before 9am to my supervisor about 10am. 40 minutes substantially. I was ba

Speak your science: How to give a better conference talk, Part 1

by Astrobites | Feb 10, 2018 | Guides | 8 comments

Today, we have the first of three cros. Society. Emily is an internationally ac Masters degree in planetary geology.

You can find Emily's original post fro

Astrobites at AAS 231: Day 3

by Astrobites | Jan 12, 2018 | Current Events | 0 comments

Welcome to the winter / Maryland! Astrobites is i each day here. If you'd li to search the #aas231 h so be sure the visit the

Plenary Talk: Venu

Darby Dyar of the Plan participating scientist fo science. In today's first r

Meet the AAS Keynote Speakers: Lars Bildsten

by Ashley Villar | Jan 5, 2018 | Career Navigation, Current Events | 0 comments

In this series of posts, we sit down with a few of the keynote speakers of the 231st AAS meeting to learn more about them and their research. You can see a full schedule of their talks [here!](#)

The evolution and characteristics of stars affects every part of our universe — from the light of far away galaxies to the composition of our solar system. **Lars Bildsten's** research focuses on unravelling the lives of stars and determining their fundamental properties



Personal achievement

How Can AAS Meetings Be Improved? Part 1

Tuesday, September 20, 2016 - 14:14

This is the first of two articles about the future of AAS meetings. Part 1 discusses the big-picture view: What purpose do our meetings serve, and are we addressing the needs of the membership, and do we respond to feedback? Part 2 will cover some of the practical details of making changes: considerations of cost, meeting locations, scientific content, and logistics.

Meeting cost is a major concern for most attendees, and increasingly so for those who have to make hard budget choices between attending AAS meetings, observing, publishing, and supporting their own and their students' research. Keeping a lid on costs is a continual concern for the AAS meeting staff. Wisely, the AAS has a small staff of full-time experts who negotiate contracts with hotels and meeting venues and handle the logistical tasks of processing registrations and abstracts and all the myriad details that must be dealt with so that the meetings can run efficiently. It's a truism (familiar to anyone who has organized a conference or workshop) that the planning and organization (and sometimes also the organizers) are invisible — but only if the meeting goes smoothly!

Unfortunately, the options for reducing meeting cost, especially for the large winter meetings, are limited, and the task force weighed the merits of a number of changes that would have far-reaching implications. For instance, one way to reduce costs is to hold meetings in smaller cities that may have more affordable hotels; but for the winter meetings, there aren't a lot of affordable choices among venues that can comfortably accommodate us. In addition, travel to smaller cities may be more expensive, and if attendance drops, the costs must be amortized across fewer attendees.



Being the AAS media intern

- In charge of live-blogging
- Assist press conferences
- Making connections
- Making connections
- Making connections



American Journal of Physics Paper

- Incorporating current research into formal higher education settings using Astrobites
- arXiv: 1706.01165



Incorporating current research into formal higher education settings using Astrobites

Nathan E. Sanders^{a)}

Astrobites Collaboration, 1667 K Street NW, Suite 800, Washington, DC 20006

Susanna Kohler

American Astronomical Society, Washington, DC 20006

Chris Faesi and Ashley Villar

Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts 01238

Michael Zevin

Northwestern University Department of Physics, Evanston, Illinois 60208-3112 and the Astrobites Collaboration, 1667 K Street NW, Suite 800, Washington, DC 20006

(Received 11 April 2017; accepted 4 June 2017)

A primary goal of many undergraduate- and graduate-level courses in the physical sciences is to prepare students to engage in scientific research or to prepare students for careers that leverage skillsets similar to those used by research scientists. Even for students who may not intend to pursue a career with these characteristics, exposure to the context of applications in modern research can be a valuable tool for teaching and learning. However, a persistent barrier to student participation in research is familiarity with the technical language, format, and context that academic researchers use to communicate research methods and findings with each other: the literature of the field. Astrobites, an online web resource authored by graduate students, has published brief and accessible summaries of more than 1300 articles from the astrophysical literature since its founding in 2010. This article presents three methods for introducing students at all levels within the formal higher education setting to approaches and results from modern research. For each method, we provide a sample lesson plan that integrates content and principles from Astrobites, including step-by-step instructions for instructors, suggestions for adapting the lesson to different class levels across the undergraduate and graduate spectrum, sample student handouts, and a grading rubric. © 2017 American Association of Physics Teachers. [<http://dx.doi.org/10.1119/1.4991506>]

I. INTRODUCTION

Scientific literature simultaneously serves two roles: it is the primary means by which we communicate our results to our colleagues, and it provides a historical record of progress in our field. But the literature should also play a critical third role: the introduction to our profession for the next generation of researchers. While textbooks also play an important role in this introduction, by their nature they do not encompass the most recent research results. Moreover, textbooks cannot expose the process and motivations of science in the same way the primary source material of the scientific literature does.

Unfortunately, success in the first two roles often inhibits success in the third. Effective communication between peers relies on shorthand, established jargon. Experts are able to unspool references by using their familiarity with the context, and they can fluidly interpret discipline-specific vernacular and units. To establish a legacy continuous across generations of scientists, the literature must make passing reference to decades of research results, presenting an impenetrable web of dense manuscripts to newcomers. This common vocabulary of ideas—thoughts, terms, and historical findings—is integral to concise communication among specialists, but obscures meaning and clarity to students of the field.

Many students' first contact with the literature presents a barrier rather than a facilitator to a career in research. The process starts when an undergraduate approaches a professor or other researcher, asking to take part in a research project for the first

time. For a mentor eager to get a first-time researcher up to speed, it can seem convenient and straightforward to provide the student with a set of the canonical, comprehensive written works in the field. But without prior exposure to the literature, the first paper sets a rather high activation energy for students to surpass to become an active contributor to the field.

A. Integrating research and education

Undergraduate research experiences have been shown to be an integral step in the STEM career path.^{1,2} Lowering barriers to participation in research facilitates the pursuit of several goals. It may make the practice of scientific research more accessible to students from backgrounds traditionally under-represented in the sciences and lead to higher retention of such students.^{3,4} Furthermore, it could improve science self-efficacy⁵ among emerging researchers and the productivity of early-career scientists.

While faculty with the research literature in the field is unambiguously critical to the success of academic researchers in any scientific field, the comprehension, communication, and analytical skills associated with that faculty are broadly applicable across nearly all occupations pursued by trained physicists. When the Joint Task Force on Undergraduate Physics Programs of the American Physical Society (APS) and American Association of Physics Teachers (AAPT) released their final report in 2016,⁶ three of the four consensus skills they identified as instrumental to

Lesson types overview

1. Reading Assignment (early undergraduate)

- Student task: read astrobite(s) and respond
- Objectives: subject comprehension; intro to research literature

2. Research Project (late undergraduate)

- Student task: research an astronomy topic of interest via astrobites
- Objectives: independent topical research; synthesis; interpretation

3. Write an Astrobite (advanced undergraduate/graduate)


- Student task: write a summary article based on a journal paper
- Objectives: high-level comprehension; composition; communication



Rambling on science communication




Let's play a game



Get in groups of 2
One of you step outside for 30 sec

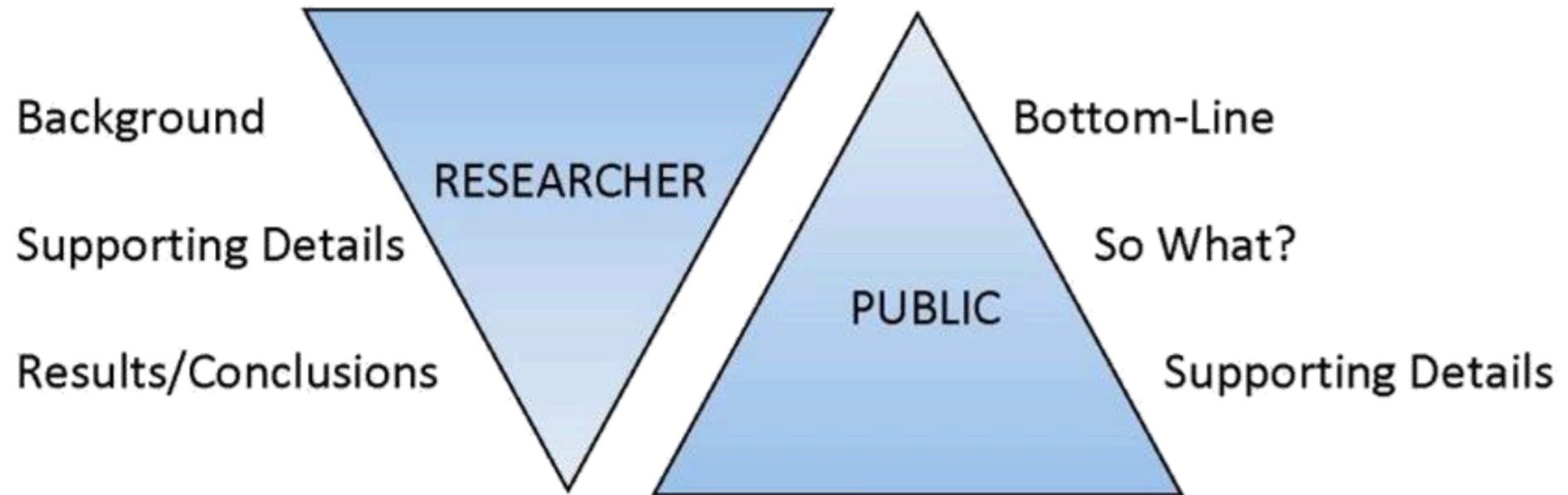
A decorative graphic in the bottom-left corner consisting of several overlapping diagonal lines in shades of blue and grey.

Only you hear the melody in your head



Only you hear the melody in your head
You even wrote the song

Different styles of communication





To express rather than to impress

ComSciCon 2018 National Workshop



Communicating Science National Workshop 2018



- Annual workshop for grads, 100% free
- June 14 – 16, 2018
- Application deadline: March 1, 2018
- Extremely hard to get in (50 out of 1000+)
- Panel discussion + hands-on workshop + networking (students, journalists, authors, policy people)

Question 1:

Describe your previous experience in science communication and how that experience is innovative, unique, or impactful.

Describe one or more science communication efforts you've been involved in, and what you believe may be particularly impactful or innovative about those efforts. These could include participation or leadership in student organizations, contributions to science outreach programs, blogging or other writing for the general public, activity on social media, or other experiences. Try to focus on activities outside of your regular duties as a graduate student.

Write no more than 750 characters (includes spaces).

Question 2:

Please describe your research as you would to the general public.

Imagine you are asked about your research by a member of the general public. Please give an example of how you would describe the work that you do in an accurate, but exciting and engaging way.

Write no more than 500 characters (includes spaces).

Question 3:

How will attending ComSciCon help further your goals as a science communicator?

For example, consider one or more of the following questions: Are there new efforts you are hoping to launch or get engaged in through the connections you would make at ComSciCon? How would attending help or influence your ongoing projects and your future career? How would you bring the things you learned at ComSciCon back to your home institution?

Write no more than 500 characters (includes spaces).

Writer resources

The National Association of Science Writers offers a wide array of resources to the science writing community, many of which do not require NASW membership. In addition, NASW members can take advantage of tools (marked with an asterisk below) that can help them improve their standing in the science writing marketplace. For more information on NASW membership, see our page on the [benefits of NASW membership](#)

- [NASW news](#)
Important updates for members
- [New to science writing?](#)
Mentoring, FAQ, helpful links, and more
- [All about freelancing](#)
Tools and tips for the solo practitioner
- [Marketing & publishing resource](#)
Articles and useful links for authors
- [Public information officers](#)
Getting the word out about science
- [Teaching science writing](#)
Syllabi, exercises, and other material
- [* Jobs bank](#)
Job ads and freelance opportunities
- [* The Fine Print](#)
Real contracts submitted by writers
- [* Science writers compensation](#)
A survey of our members and their pay
- [* Fair Pay Tip Sheet](#)
Resources for compensation issues
- [* Words' Worth](#)
Journalists report on their clients
- [* Funding Sources database](#)
Grants and other support for journalists
- [* Information access](#)
Share strategies, tips, and experience
- [Idea Grants](#)
NASW's own grants program
- [Publications](#)
Official publications from NASW

Career as a science writer

FEB
20
2018

Magazine Editor, Cornell University College of Agriculture and Life Sciences (Full-time, Ithaca, NY)

The College of Agriculture and Life Sciences is a pioneer of purpose-driven science and Cornell University's second largest college. We work across disciplines to tackle the challenges of our time through world-renowned research, education and outreach. Since our founding, we have evolved continuously to meet the changing needs of our world. Our top-ranked programs include over 20 majors in community and rural development, environment and natural resources, food and nutrition, communication, applied economics, agriculture, international programs and life sciences.

[READ MORE](#)

FEB
16
2018

Staff Editor, Physics, American Physical Society (Full-time, Ridge, NY)

Physics seeks Staff Editor

Physics (<http://physics.aps.org>), an online publication from the American Physical Society, seeks a talented physical sciences writer or editor to join its editorial team.

[READ MORE](#)

FEB
15
2018

Journalist in Residence, Simons Institute for the Theory of Computing (UC Berkeley) (Contract, Berkeley, California)

The Simons Institute for the Theory of Computing seeks Journalists in Residence for visits during the 2018-19 academic year.

[READ MORE](#)

FEB
15
2018

Sr Director of Communications, The Salk institute (Full-time, San Diego, CA)

Reporting to the VP, External Relations and as a member of his/her direct reports team, the position oversees the comprehensive communications program for the Salk Institute that further enhances the Institute's local, regional, national, and international reputation as a world leader in basic biological research. Position manages media relations, publications, audio-visual and graphic arts services, and public relations for the Institute.

[READ MORE](#)



Questions?