



# Institute for Advanced Computational Science

Robert J. Harrison, Director  
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Stony Brook University

# What is IACS?

- A multidisciplinary institute with a focus on computational and data science
- \$20M endowment
- 13 core faculty, 34 affiliate faculty, 90+ students
- Newly renovated space
  - ~6000 sq. ft., 17 faculty offices, 45 students



# What is Computational Science?

**Simulation**



**Data**



**Hardware/Software**

# IACS Core Faculty



**Alan Calder**  
Physics & Astronomy



**Barbara Chapman**  
Applied Math,  
Computer Science



**Rezaul Chowdhury**  
Applied Math



**Marivi Fernandez-Serra**  
Physics & Astronomy



**Robert Harrison**  
IACS Director



**Jeffrey Heinz**  
Linguistics



**Xiangmin Jiao**  
Applied Math



# IACS Core Faculty



**Marat Khairoutdinov**  
SOMAS



**Predrag Krstic**  
IACS



**Heather Lynch**  
Ecology & Evolution



**Artem Oganov**  
Geosciences



**Jason Trelewicz**  
Materials Science



**Matthew Reuter**  
Applied Math

# IACS Students

96 Students - 41 core; 55 affiliated



Zafar Ahmad



Hina Arora



Qiao Chen



Mahdi Davari



Simon Divilov



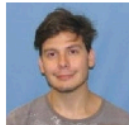
Alena Aksenova



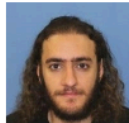
Shilpi Bhattacharyya



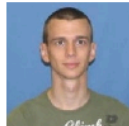
Bin Cheng



Aniello De Santo



Hossep Dolatian



Joel Anderson



Alexander Borowicz



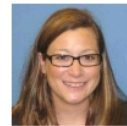
Rathish Das



Sebastian Dick



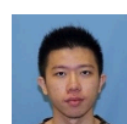
Olivia Donaldson



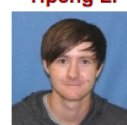
Catherine Foley



Longtao Han



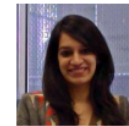
Yipeng Li



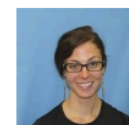
Philip McDowall



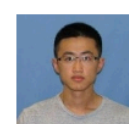
Jonathan Rawski



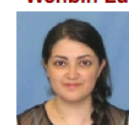
Aditi Ghai



Rachael Herman



Wenbin Lu



Delafrouz Mirfendereski



Hamid Reza As'adi



Bento Goncalves



Mohammad Mahdi  
Javanmard



Maureen Lynch



Alok Mishra



Panu Sam-Ang

# Where do Alumni get jobs?

- Assistant Professor of Mathematics, St. Peter's University, NJ
- Postdoctoral Associate, University of Maryland
- Founder & CEO, Learning is Beautiful
- Postdoctoral Associate, Michigan State University
- Solutions Architect, NVIDIA
- Research Scientist, Google
- HPC Software Architect, Intel Corporation
- Technical Staff, Vmware
- Senior R&D Engineer, Synopsys Inc.
- Software Development Engineer, Amazon.com Inc.

# IACS Computer Resources



- Handy
  - 40 dual-socket Sandybridge nodes, 2 NVIDIA K20 GPUs, 2 Intel KNC, 250 TB disk
- LI-red
  - 100 dual-socket Haswell nodes, 250 TB disk
  - 1 quad-socket Haswell node with 3 TB memory
  - 1 IBM Power8 node
- Two Intel KNL development systems
- Sea-wulf
  - 160+ dual-socket Haswell nodes, 1PB disk, 32 NVIDIA K80 GPUs

# Center for Inclusive Education & IACS

- **Turner Dissertation Fellowship**
  - 1 or 2 year awards (\$10k per year)
  - PhD Student at SBU
  - US Citizen or Permanent Resident
  - Advancement to Candidacy
  - Nominations-based
- **Faculty Career Week**
- **Research Café Series**
- **Recruitment Conferences & Campus Visits**



(L) Adrian Soto Cambres and Rosalia Davi represented the Institute for Advanced Computational Science and the Center for Inclusive Education at the 2016 Richard Tapia Celebration of Diversity in Computing in Austin, TX.



# CDCSE Certificate (not yet approved)

17 credits

✧ 3 core courses

JRN 501 Distilling Your Message  
JRN 503 Improvisation for Scientists  
AMS 561 Intro to Computational Science



# STRIDE Certificate (approved)

15 credits

✧ 6 core courses

JRN 501 Distilling Your Message	JRN 511 Scientific Communication for
JRN 503 Improvisation for Scientists	Decision Makers
MAR 534 Scientific Decision	Home Department Statistics course
CSE 564 Visualization	

# STRIDE



**STRIDE**

**Stony Brook University and the Institute for Advanced Computational Science invite students to take part in STRIDE: Science Training and Research to Inform DECisions.**

Within all sectors of industry and government, effective decision making depends on the ability of scientists to interpret data and communicate results in a way that supports the decision-making process. Learn how to communicate your research to the policy makers; understand the perspectives of stakeholders; and translate scientific uncertainty into action.

## Science Training and Research to Inform DECisions

# IACS Student Association



## Research Events

- IACS Student Seminar Series
- Brown-Bag Lunch Sessions

## Professional Development

- Scientific Communication Workshop
- Patents Workshop

## Social Events

- Student-Faculty Dinners
- Group Outings to NYC

# Social Networking



**NEED TO  
TAKE A  
BREAK  
FROM THE  
GRADUATE  
SCHOOL  
ROUTINE?**

**IACS STUDENT ASSOCIATION  
Kickoff Event**

THURSDAY, DECEMBER 3  
6:00PM TO 8:00PM

THE BENCH BAR & GRILL  
APPETIZERS AND DRINKS WILL BE PROVIDED

Come have a drink with your IACS peers.  
While you're there, meet the members of  
the new IACS Student Association

See website for details.

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**THE IACS STUDENT ASSOCIATION PRESENTS**

**MOVIE NIGHT**

**THURSDAY, JAN. 21  
7:00PM TO 8:45PM**

LOOKING FOR SOMETHING TO DO DURING THE HOLIDAY BREAK?  
COME HANG OUT WITH YOUR IACS PEERS AND WATCH THE PHD  
MOVIE, A COMEDIC TAKE ON GRADUATE STUDENT LIFE.

RSVP REQUIRED

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ADMIT ONE  
PIZZA,  
SNACKS,  
AND  
BEVERAGES  
WILL BE  
PROVIDED



**THE IACS STUDENT ASSOCIATION PRESENTS**

**Spring Break  
Warm Up**

**MARCH 10TH, 5:30 - 8:30  
THE ARDEN**  
(201 MAIN STREET, PORT JEFFERSON, NY 11777)

WHO SAYS SPRING BREAK BEGINS ON MONDAY? JOIN THE IACS  
STUDENT ASSOCIATION FOR HAPPY HOUR AT THE ARDEN AND GET  
A HEAD START ON SPRING BREAK!

IF YOU NEED TRANSPORTATION TO THE LOCATION, PLEASE RSVP BY MARCH 1ST.  
SEE WEBSITE FOR DETAILS

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**DINING FOR SUCCESS**  
*Etiquette Dinner*

**THURSDAY NOV. 19, 6PM-8PM**

Join us for a three-course meal while  
learning how to navigate a formal place  
setting, a waiter's advance and make  
casual dinner-time conversation.

This is the perfect event to help you prepare  
for attending professional dining events and  
formal affairs.

See website for details.

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# Student Seminar Series

New Student Seminar Series started in fall 2016, organized by the IACS Student Association

Students are offered a 'trial run' in front of their peers two days before presenting

IACS STUDENT SEMINAR SERIES

**AUTONOMOUS SATELLITE-BASED SURVEYS OF ANTARCTIC SEALS USING MULTI-SCALE CONVOLUTIONAL NEURAL NETWORKS**

**ABSTRACT**

As a species, penguins are one of the best-studied animals in the world. However, they are also one of the most difficult to study. They are highly mobile, often traveling long distances, and are often found in remote, inaccessible locations. This makes it difficult to collect data on their behavior and distribution. In this seminar, we will present our work on using autonomous satellite-based surveys to study Antarctic seals. We will discuss the challenges of collecting data on seals from space, and how we have overcome these challenges using multi-scale convolutional neural networks. We will also discuss the importance of understanding seal behavior and distribution for conservation efforts.

**BIOGRAPHY**

Dr. [Name] is a postdoctoral fellow at the [Institution]. He received his PhD from [Institution] in [Year]. His research interests include [Research Interests]. He is currently working on [Current Project].

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IACS STUDENT SEMINAR SERIES

**UNCERTAINTY QUANTIFICATION AND SENSITIVITY ANALYSIS FOR INERTIAL CONFINEMENT FUSION SIMULATIONS**

**ABSTRACT**

Inertial confinement fusion (ICF) is a promising approach to achieving net energy gain. However, the process is highly complex and involves many uncertainties. In this seminar, we will discuss our work on uncertainty quantification and sensitivity analysis for ICF simulations. We will present our results on the impact of various input parameters on the output of the simulations, and how we have used these results to optimize the design of the experiments.

**BIOGRAPHY**

Dr. [Name] is a postdoctoral fellow at the [Institution]. He received his PhD from [Institution] in [Year]. His research interests include [Research Interests]. He is currently working on [Current Project].

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IACS STUDENT SEMINAR SERIES

**INTERCONNECT TOPOLOGY DISCOVERY BY COMPUTATIONAL CLUSTER EMULATION**

**ABSTRACT**

Computational cluster emulation is a powerful tool for understanding the behavior of complex systems. In this seminar, we will discuss our work on interconnect topology discovery by computational cluster emulation. We will present our results on the discovery of new topologies and the impact of these topologies on the performance of the system.

**BIOGRAPHY**

Dr. [Name] is a postdoctoral fellow at the [Institution]. He received his PhD from [Institution] in [Year]. His research interests include [Research Interests]. He is currently working on [Current Project].

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**WEDNESDAY, MAY 3<sup>rd</sup>**  
**1:15-2:15 PM**

INSTITUTE FOR ADVANCED COMPUTATIONAL SCIENCE

IACS Seminar Room  
IACS BUILDING

PH: 631.632.4629 • FX: 631.632.4125  
<http://www.iacs.storybrook.edu> • [iacs@storybrook.edu](mailto:iacs@storybrook.edu)



# IACS Researcher Awards

Raises department-paid stipend to \$34K plus \$4k for travel and equipment



**Aditi  
Ghai**



**Alena  
Aksenova**



**Bento  
Gonçalves**



**Maria  
Barrios Sazo**



**Zeyang  
Ye**



**Rathish  
Das**

# IACS Travel & Writing Awards

## ARE YOU PUBLISHING YOUR FIRST PAPER?

All IACS students are eligible for the  
IACS Young Writer's Award,

a one-time prize of  
**\$500**

to celebrate your first paper that is  
accepted in a peer-reviewed publication.

See website for details.



The graphic for the IACS Travel Award features the text "iACS" in red with a logo of three interlocking rings (blue, yellow, red) to its left. Below this, "Travel Award" is written in a large, green, cursive font. Underneath "Travel", "\$2000" is written in red, followed by "in reimbursed travel costs" in black. At the bottom, there is a colorful silhouette of a city skyline with various landmarks like the Eiffel Tower, Big Ben, and the Leaning Tower of Pisa. A small text "See website for details." is located at the bottom right of the graphic.

**\$2000** in reimbursed travel costs

See website for details.

# Workshops, Tutorials, Courses

**PHY 546: Python for Scientific Computing**  
Instructor: Michael Zingale, [michael.zingale@stonybrook.edu](mailto:michael.zingale@stonybrook.edu)  
Mondays, 3:00-3:53pm  
1 credit, Students need to bring laptops to class

## Python for Scientific Computing

a weekly graduate seminar on techniques for scientific programming  
instructor: Michael Zingale ([michael.zingale@stonybrook.edu](mailto:michael.zingale@stonybrook.edu))

Python has seen wide adoption in the scientific community for data analysis, simulation, prototyping, and visualization. It provides a simple, yet powerful means to build applications. This seminar introduces python and its use in scientific computing.

### • Flipped course format:

- We'll work through interactive notebooks outside of class.

### • Topics include:

- Python
- Version control with [git/pip](#)
- [Jupyter](#) notebooks/workflow management
- The [NumPy](#) array package
- The [SciPy](#) tools and basics of numerical methods
- [Matplotlib](#) and [Pylab](#) for visualization

## PHY 504: Computational Methods in Physics and Astrophysics

Instructor: Alan Calder ([alan.calder@stonybrook.edu](mailto:alan.calder@stonybrook.edu)), 3 Credits  
Time: Monday, Wednesday, Friday 9:00 to 9:53 AM  
Location: Math SINC Site, Students will use the computers provided

An introduction to procedural and object-oriented programming in a high-level language such as C++ or modern Fortran with examples and assignments consisting of rudimentary algorithms for problems in physics and astronomy. Students will use the UNIX/Linux operating system to write programs and

will include an editing and good version control and prepare students methods that assume a

*This new graduate introduction to programming course is being offered in the spring of 2017 and it is meant to be an introduction to programming and the Linux/Unix operating system for students with no prior programming experience. Students will gain the knowledge and experience to begin computational research or take advanced computational courses that assume programming experience.*

*Please note that while this is a physics course, the examples and assignments will be appropriate for students with a variety of backgrounds.*

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### EVENTS

Seminars  
Workshops  
Events

### EVENT CALENDAR

Calendar link

### GPU Programming Workshop

[View](#) [Edit](#)

The overwhelming interest in the GPU Hackathon hosted at Brookhaven National Laboratory ([www.bnl.gov/gpuhackathon](http://www.bnl.gov/gpuhackathon)) makes it clear that there is a strong demand for hands-on training for GPU programming. We will partner with NVIDIA and in particular its PGI compiler team to organize a 3-day hands-on GPU programming workshop/mini-Hackathon for teams that were not admitted to the Brookhaven Hackathon.

Registration required. [Click here to register.](#)

DAY 1: The first day will consist of introductory lectures given by PGI compiler engineer Matt Colgrove, NVIDIA and is open to the public.

DAY 2 & 3: The 2nd and 3rd days will be spent on the Hackathon application teams' codes. GPU experts will be present to answer questions and assist the teams to get started with their GPU porting efforts.



SPEAKER  
Matt Colgrove  
DATE  
Monday  
Wednesday  
TIME  
Monday-6  
Wednesday

## NVIDIA Workshops on Deep Learning, Pascal, CUDA & OpenACC

Tuesday March 14<sup>th</sup> &  
Wednesday March 15<sup>th</sup>





# IACS Research Day



Morning presentations followed  
by lunch and poster session

# Opportunities to teach



- Undergraduate Python
- Research Methods Workshop
- High School Python
- Master Teacher Python
- R programming



# Questions?

Lynn Allopenna, Administrative Director

[Lynn.Allopenna@stonybrook.edu/2-2345](mailto:Lynn.Allopenna@stonybrook.edu/2-2345)

Sarena Romano, Travel & Event Coordinator

[Sarena.Romano@stonybrook.edu/2-2346](mailto:Sarena.Romano@stonybrook.edu/2-2346)

Jennifer McCauley, STRIDE administrator

[Jennifer.Mccauley@stonybrook.edu/2-2341](mailto:Jennifer.Mccauley@stonybrook.edu/2-2341)

Rosalia Davi, CIE Diversity Outreach Coordinator

[Rosalia.Davi@stonybrook.edu/2-7401](mailto:Rosalia.Davi@stonybrook.edu/2-7401)