



Kempner Institute

for the Study of Natural and Artificial Intelligence

Spring Update 2023

THE KEMPNER INSTITUTE'S MISSION

To study intelligence, broadly speaking.

The fields of natural and artificial intelligence are intimately connected.

OUR RESEARCH

We seek to understand the basis of intelligence in natural and artificial systems

- **Foundations of intelligence:** mathematical and computational models of intelligence, cognitive theories of intelligence, computational neurobiology, and the neurobiological basis of intelligence.
- **Applications of artificial intelligence:** natural language processing, visual scene processing and analysis, mechanistic analysis of high dimensional neural and behavioral data from an engineering standpoint (e.g., development of new methodologies or advancing the state of the art) or a scientific one (e.g., achieving a better understanding of deep learning).

OUR COMMUNITY

Interfaculty initiative operating out of the Provost's office.

Working with many schools to engage and add to the **breadth of talent and expertise** within the Harvard community.

Building a vibrant community with people from **diverse** backgrounds and perspectives to work across fields.

Committed to **Open Science** and making research funded by the Kempner Institute widely and easily available.

Bringing together the **people, space and technology** necessary to pursue cutting-edge research and support a generation of students.

Agenda

- Infrastructure Space, Team
- Three Programmatic Components Research, Education, Compute
- Getting involved

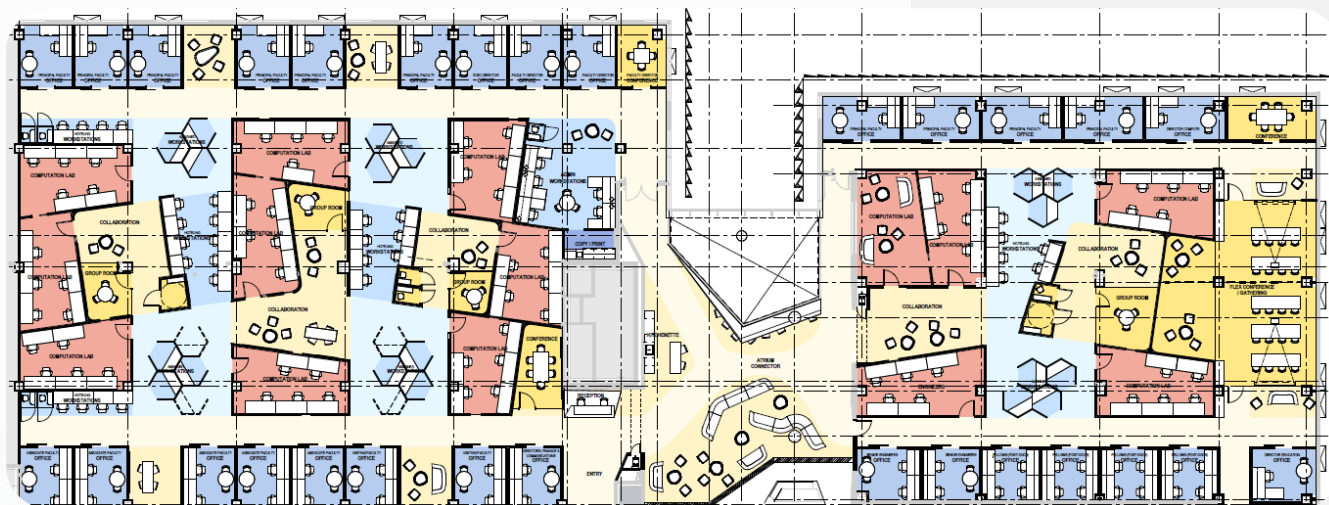
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Space

6th Floor of the Science & Engineering Complex

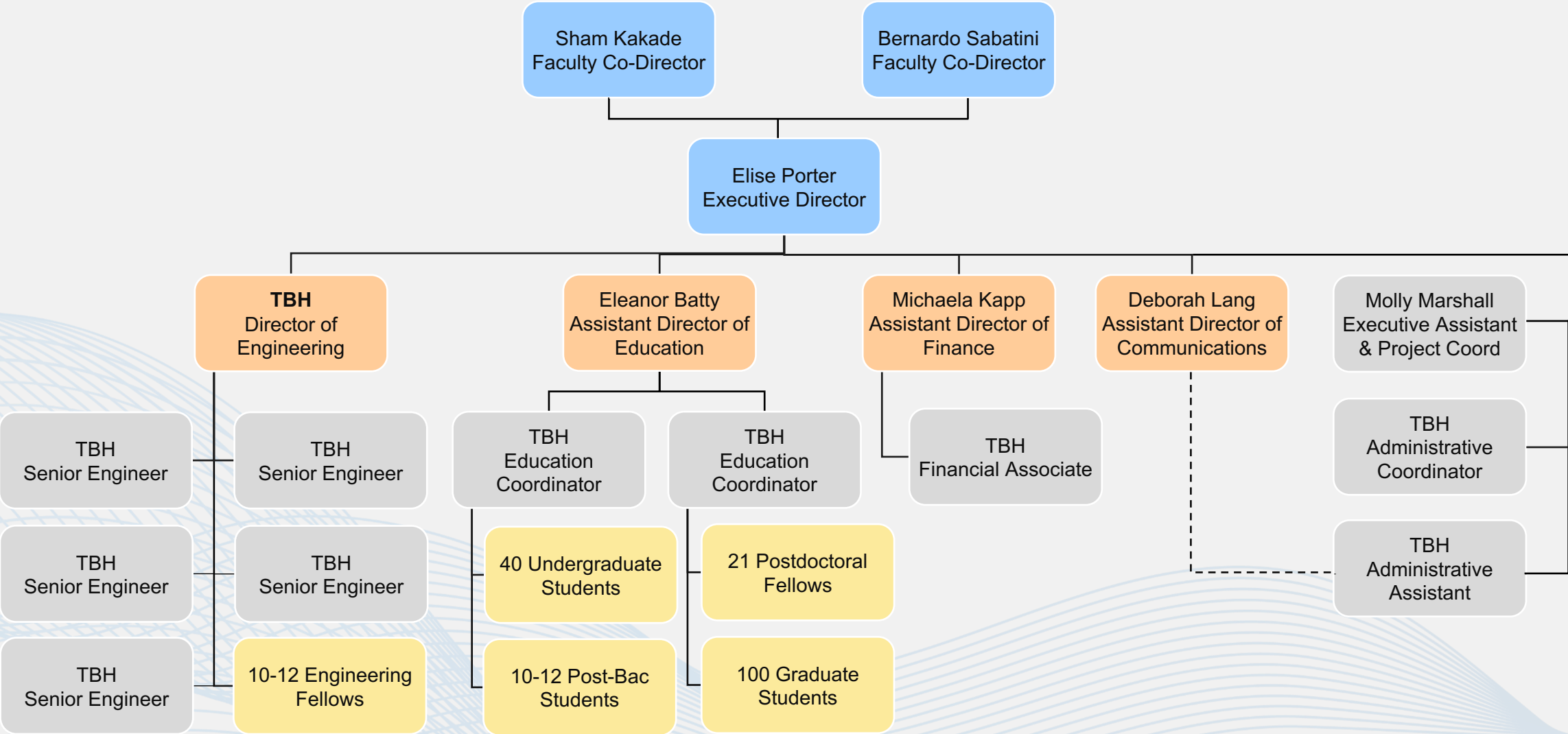
- Opening early winter 2024
- 30,000 sqft of space
- Space for the Kempner community
 - 29 private and shared offices
 - 13 computation labs
 - 40+ open or assigned desks
 - 12 collaboration spaces
 - 10 conference rooms



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UNIVERSITY

Kempner Institute

Org Chart



Current team



Elise Porter
Executive Director



Ella Batty
Assistant Director of
Education



Deborah Apsel Lang
Assistant Dir of
Communications



Michaela Kapp
Assistant Director of
Finance



Molly Marshall
Executive Assistant and
Project Coordinator



Advisory Steering Committee



Boaz Barak
SEAS



Francesca Dominici
HSPH



Finale Doshi-Velez
SEAS



Catherine Dulac
FAS



Robert Gentleman,
HMS



Samuel Gershman
FAS



Isaac Kohane
HMS



Susan Murphy
FAS/SEAS



Venkatesh Murthy
FAS



Fernanda Viégas
SEAS



John Shaw
Vice Provost for
Research



Willy Lensch
Associate Provost for
Research



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Program Pillars

AY23 Initiatives

Research

- Institute Investigators (Core Faculty)
- Associate Faculty
- Affiliate Faculty
- Visiting Scientists
- Grants

Education

- Kempner Research Fellows (7/year)
- Grad. Student Fellowships (~20/year)
- Postbaccalaureate Program
- Undergraduates
- Educational programming

Compute

- GPU (~1000 GPUs)
- Senior Engineers
- Engineering Fellows



Institute Investigators (Core Faculty)

- **Recruiting 10 new faculty** in partnership with schools
 - **Variety of disciplines:** AI/ML, Applied Math, Statistics, Cognitive Psychology, Neuroscience, Biology, Physics
 - Mix of theoretical and experimental approaches
- Private office and lab space in the Kempner Institute space
- Access to Compute resources
- AY23 search: **HMS and Kempner**
- AY24 hope for searches: **SEAS, FAS and Kempner**

Associate Faculty

- Associate Faculty drawn from existing faculty at Harvard
 - Have a **demonstrated record** of research accomplishments that are aligned with the Kempner research mission
 - **Deeply engaged** and available to help build the Kempner community
- Benefits:
 - 3-year, renewable terms
 - Research support (for first term only)
 - Access to hoteling office space in the Kempner Institute
 - Access to Kempner compute and engineering team

**AY23 faculty nominated by Kempner Steering Committee.
Moving to open call for applications from Harvard faculty in AY24**

AY23 Associate Faculty



Demba Ba (SEAS)



Talia Konkle (FAS)



Cengiz Pehlevan (SEAS)



Haim Sompolinsky (FAS)



Marinka Zitnik (HMS)



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Affiliate Membership

- Drawn from Harvard community
- Simple application process via Kempner website

Faculty Membership

- Can request access to space
- Can request access to compute cluster
- Can volunteer to host and mentor students

Student Membership

- Can request access to space
- Can participate in educational activities
- Learn about research opportunities

Applications to open fall 2023

Future programs...

- Visiting Scientists

- Pre-eminent leaders in their field, from a variety of disciplines
- Hosted for 3-6 months
- Space in the Kempner suite in the SEC
- Expected to launch in AY24

- Grants

- Will be internal to Harvard only
- Specific guidelines and RFP to be developed
- Hoping to issue call for applications spring/summer 2024

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Kempner Research Fellows

- Early-career scientists pursuing research projects with autonomy
 - Similar to Postdocs
 - Akin to the Harvard Society Junior Fellows
- Generous salary and research support
- Access to compute and shared office in the Kempner space
- 3-year fellowship
- Will recruit 6 to 8 fellows each year
- Next application cycle opening late fall 2023

Incoming Class of Kempner Research Fellows



David Brandfonbrener



Wilka Carvalho



Jennifer Hu



Naomi Saphra



Ilenna Jones



Andy Keller



Eran Malach



Binxu Wang



Kempner Graduate Fellowships

We will not be starting our own graduate program.

Fellowships support graduate students doing research in alignment with our mission.

We will award graduate fellowships to ~**10 incoming** and ~**10 existing** (G1 or G2 at time of application) students each year. Incoming students are nominated by the graduate program. Existing students can self-nominate.

Student Benefits

- Full stipend, tuition, health insurance and health fees **up to G6**
- Ability to apply for professional development funds starting in year 2
- Connection to a Kempner Institute-affiliated mentor
- Access to compute, engineers, and space in the Kempner Institute suite in SEC
- Funding is tied to the **student** not to the mentor

Kempner Graduate Fellowships

Awarded Incoming Student Fellowships

Biophysics (1)

Applied Math-SEAS (1)

Computer Science-SEAS (2)

Program in Neuroscience (PiN) (2)

Speech Hearing Bioscience & Technology (1)

Rising 2nd & 3rd Year Fellowship Applications

- Applied Mathematics
- Applied Physics
- Bioinformatics & Integrative Genomics
- Biological & Biomedical Sciences
- Biostatistics
- Chemistry & Chem Biology
- Computer Science
- Engineering Sciences
- Molecular & Cellular Biology
- Program in Neuroscience
- Organismic & Evolutionary Biology
- Physics
- Population Health Sciences
- Psychology
- Public policy
- Speech Hearing Bioscience & Technology
- Statistics

10 fellowships for rising students will be awarded in May 2023

Future Educational Programs

Undergraduate Research Program

- Will support research experience for enrolled Harvard undergrads
- Will provide academic year experience and a summer program
- Hoping to launch **spring AY24 or fall AY25**

Postbaccalaureate Training Program

- Targeting students from diverse backgrounds, not enrolled at Harvard
- Research and educational program to help students prepare for advanced degree
- Hoping to launch 2-year program in **fall AY25**

Educational Activities

- Developing bootcamps, seminars, speaker series on topics of interest for our community

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Compute

Building one of largest academic computing clusters in the world

- Steady state of 1000+ GPUs
- First shipment (144 GPUs) arrived Jan 2023
- Installed in the Mass Green High Performance Computing Center (MGHPCC) in Holyoke
- Partnering with FAS-Research Computing on equipment & support

Building a team of software engineers to support science & education

- Director of Engineering
- Will build a team of Senior Engineers (~5) and Engineering Fellows (10-12)
- Will work directly with Kempner scientists and students

Developing a fairshare policy for Kempner-affiliated faculty, fellows and students

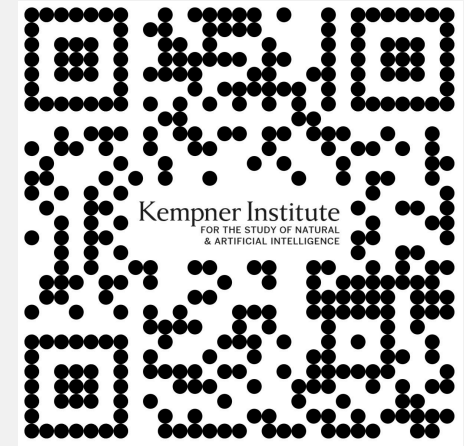
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PLEASE JOIN OUR COMMUNITY!

harvard.edu/kempner-institute/

- We are building **vibrant** community:
 - Infrastructure is underway!
 - Research/Education/Compute
- Join our **mailing list** for news and updates
- Visit our **website** to learn more about our community
- Become an Affiliate
- Apply for opportunities



Scan QR code to
join our mailing list



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Questions?



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