Community Engagement, Education, Outreach
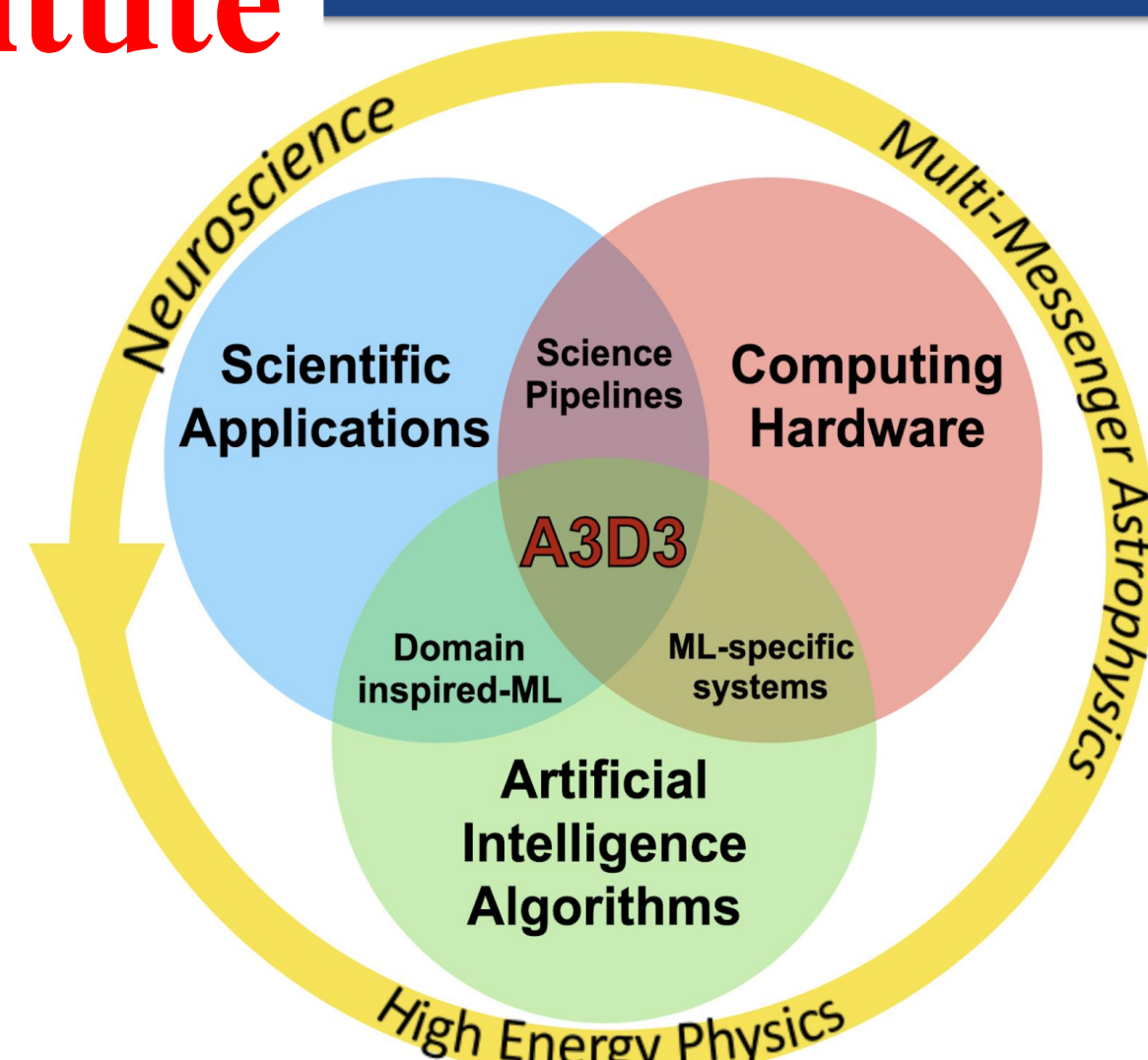
Institutions: *California Institute of Technology, University of California San Diego, Duke University, University of Illinois Urbana-Champaign, Massachusetts Institute of Technology, University of Minnesota Twin Cities, Purdue University, University of Washington Seattle, University of Wisconsin Madison*
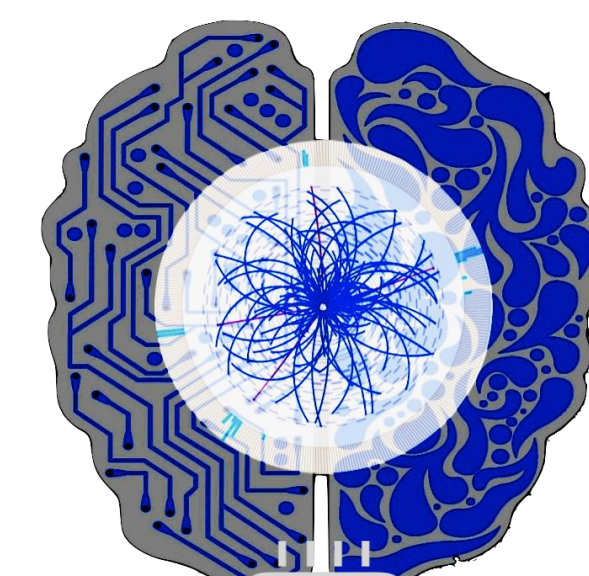
A3D3 Institute

Vision: to establish a tightly-coupled organization of **domain scientists**, **computer scientists**, and **engineers** that unite three core components that are essential to achieve **real-time AI** for data-driven discovery

9 institutions, 17 senior personnel, 2 research scientists
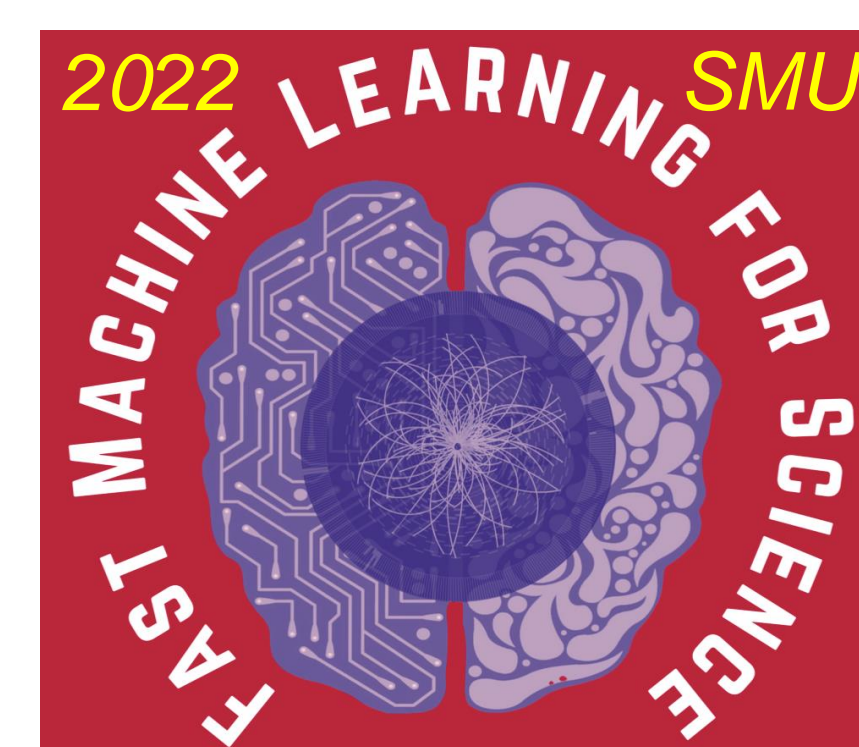10 postdocs, 15 graduates, 12 undergraduates, 4 postbacs

Postbaccalaurate Fellowships

Program: One year fellowship to increase opportunities for women and other underrepresented groups in STEM

- **Postbac fellows** are matched to a project and hosting institution based on preferences, availability and balance of areas within A3D3

- Our postbac program is now in full swing, with four Year 1 fellows paired with mentors and performing **cutting-edge research** in our core domains of high-energy physics, multimessenger astronomy and neuroscience!

- **Professional Development** Activities include:
  - *Virtual orientation event including A3D3 introduction, industry experience and graduate school discussions*
  - *Quarterly "check-in" meetings*
  - *In-person mixer event and poster session held at the 2022 A3D3 annual meeting*
  - *Student-led activities such as a journal club in planning*
- The 2023-2024 postbac fellow call to be posted on AJO
  - *We have presence with booths and fliers at affinity conferences such as **SACNAS National Diversity in STEM** and **National Society of Black Physicists***

Engagement & Outreach

- A3D3[1] aims to be a **nexus** for exchanging **new ideas**, **algorithms** and **tools** between scientific domains, AI communities and industry partners for **AI-Hardware co-design**
- Our efforts are strengthened by close collaboration with the **Fast Machine Learning** community[2] and open-source software ecosystem[3]

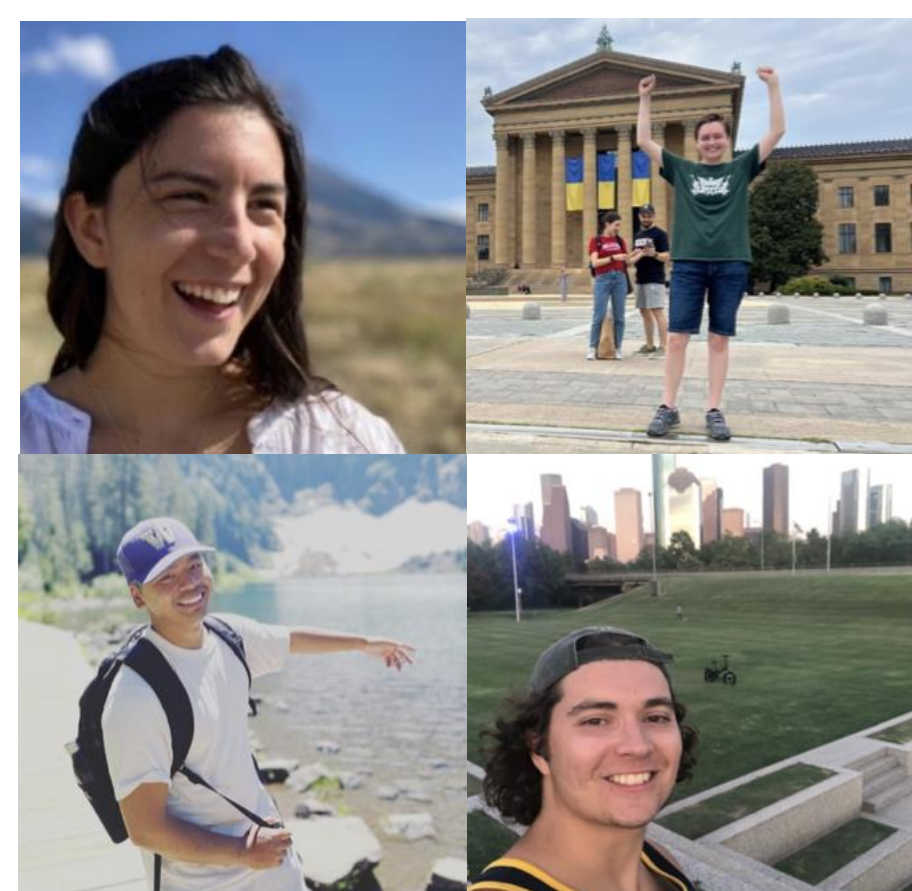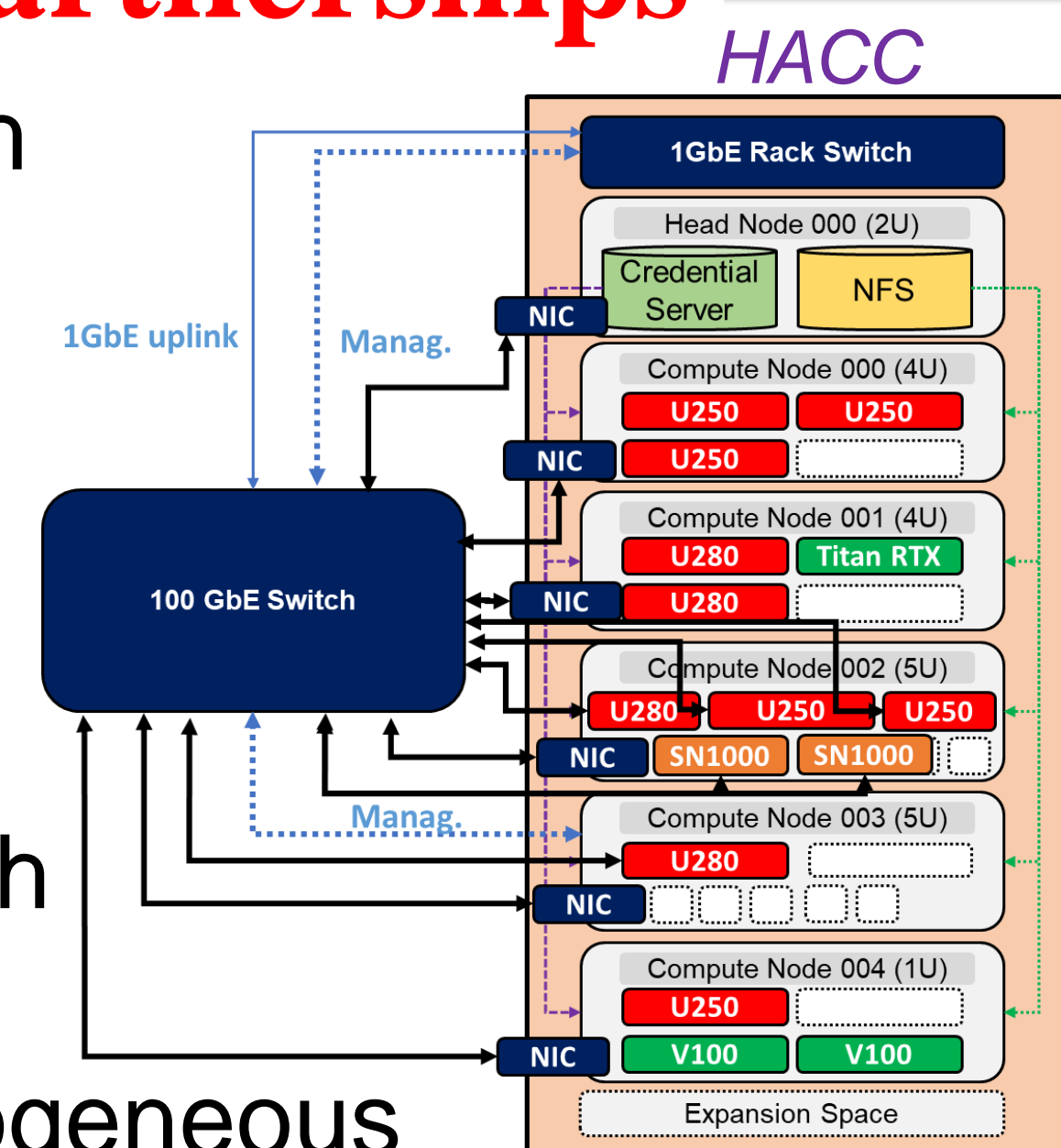- Our 2022 annual meeting[4] was co-located with the FastML for Science workshop[5]

- Our members have been active in leading community white papers, such as
  - *Applications and Techniques for Fast Machine Learning in Science[6]*
  - *Physics Community Needs, Tools, and Resources for Machine Learning[7]*
  - *Data Science and ML in Education[8]*
- Monthly seminars with invited talks by domain scientists & CS/AI researchers (on YouTube!)
- Cross-HDR activities to toward developing a **coherent** and **sustainable HDR Ecosystem**

Industry Partnerships

- Strong connection with industry leaders in **AI hardware**, **HPCs**, and **cloud computing** via integration with the Fast ML community and university research partnerships such as the AMD/Xilinx Heterogeneous Accelerated Compute Cluster (HACC) at UIUC

Training and Education

- *Training*: A3D3 members involved in running hls4ml tutorials
- *Undergraduate research*: Mentoring students in REU, SURF, …
  - E.g. SURF project on fast inference for astronomy alert streams @ Caltech
- *Curriculum*: 8 PIs **developing courses** involving **A3D3 research**!
  - Shown at APS Data Science Education Community of Practice workshop

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References

[1] https://a3d3.ai
[2] https://fastmachinelearning.org
[3] https://github.com/fastmachinelearning
[4] https://indico.cern.ch/event/1197118
[5] https://indico.cern.ch/event/1156222
[6] https://arxiv.org/abs/2110.13041
[7] https://arxiv.org/abs/2203.16255
[8] https://arxiv.org/abs/2207.09060