

MGHPCC News

MULTI-UNIVERSITY TEAMS ALREADY COLLABORATING ON SIGNIFICANT SCIENTIFIC CHALLENGES

MGHPCC Awards \$600,000 in Seed Grants for Promising Research in Wide Range of Scientific Disciplines

BOSTON, Jan. 30, 2012 – Even before the completion of construction, the Massachusetts Green High Performance Computing Center (MGHPCC) has sparked research collaboration among Boston's research universities on a variety of significant scientific challenges, awarding \$600,000 in seed grants to seven multi-university teams on issues ranging from the ecosystem off the New England coast to medical imaging to the speed of computing itself.

The MGHPCC is designed to promote research collaboration among the participating universities – Boston University, Harvard University, the Massachusetts Institute of Technology, Northeastern University and the University of Massachusetts – through high-performance computing, a pillar of major scientific research today. The seed grant program is intended to accelerate the MGHPCC's mission of computational collaboration. The first round of award winners was announced publicly today.

"These projects represent precisely the kind of ambitious, scientific endeavor that is best tackled through multi-university collaboration and that the creation of the MGHPCC envisioned," said Tom Chmura, president of the MGHPCC and vice president for economic development at UMass. "The number and quality of the seed fund applications hold great promise for both science and the success of the MGHPCC."

The seven winners were chosen from a field of 37 applications by a committee of researchers from each of the participating universities, which also funded the seed grants: James Cuff of Harvard, Alain Karma of Northeastern, Azer Bestavros of BU, Jim Kurose of UMass and Chris Hill of MIT. Kurose and Hill are the panel's co-chairs.

"The MGHPCC will provide opportunities for regional computational activities that have been out of reach until now. It is exciting to see the potential broad impact in so many areas ranging from basic science to real-time medical applications," said Hill, a senior research engineer in the Earth, Atmospheric and Planetary Sciences Department at MIT.

More than \$600,000 was awarded, with individual grants ranging from \$45,000 to \$130,000. The request for proposals sought "novel collaborative research activities addressing significant and challenging problems at the forefront of high-performance technical computing." Proposals also had to include a strategy for follow-on research that would attract external funding. Applications for another round of seed funding will be sought by the MGHPCC in the fall.

The selected projects span all three of the key facets of research computing: the use of computers as a tool for scientific discovery, development of application software that enables new types of research, and computer science research that points the way toward next generation “exascale” computer systems.

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- Lorena Barba of BU, Chris Cecka of Harvard and Hans Johnston of UMass Amherst will work on software techniques for future generation “exascale” software platforms, which will be 1,000 times faster than current computing speeds of 1,000 trillion operations per second.
- Alfredo Alexander-Katz of MIT and Alan Aspuru-Guzik of Harvard will develop high-performance computer code to simulate the kind of energy processing that occurs during photosynthesis in plants. Ultimately, the insights gained from such simulations will be transferred to the engineering domain to increase the energy-efficiency of such devices as solar panels.
- John Marshall and Pierre Lermusiaux of MIT, Amala Mahadevan of Woods Hole Oceanographic Institute and Amit Tandon of UMass Dartmouth will create models to provide insights into the turbulent mixing that regulates nutrient cycle and ocean ecosystem dynamics off the New England coast. The project will be done in conjunction with the forthcoming deployment of a state-of-the-art underwater observation platform as part of the NSF-sponsored Ocean Observatories initiative.
- Hossein Mosallaei and David Kaeli of Northeastern and Efthimios Kaxiras of Harvard will create computer models that simulate the behavior of metal, dielectric, and magnetic particles at extremely small scales, allowing insights into the behavior of important new materials.
- Patricia Ellen Grant of Harvard and Children’s Hospital and Jonathan Appavoo of BU will use high-performance computing to automate medical imaging analysis in a way that will make it easier and less costly to use by radiological clinicians.
- Yanlei Diao and Li-Jun Ma of UMass Amherst, Samuel Madden of MIT, Bai-Lin Wu of Harvard and Children’s Hospital, Toby Bloom of the Broad Institute of Harvard and MIT, and James F. Gusella of Massachusetts General Hospital will develop next-generation, on-demand services for managing and processing massive amounts of genome information.
- Ayse K. Coskun and Martin C. Herbordt of BU and Gunar Schirner of Northeastern will explore ways to measure and improve the energy efficiency of large-scale-computing. Energy issues have become a barrier to progress on computer speed.

The seed grant program is one of several initiatives designed to encourage collaborative computationally- intensive research at the institutions that founded the Massachusetts Green High Performance Computing Consortium in 2010. The Consortium is funding construction of the 90,000-square-foot computing facility, being built in Holyoke, Massachusetts, with additional support from the Commonwealth of Massachusetts, EMC, and Cisco.