glaciation. Other DOE-sponsored research included modeling more efficient photovoltaics and more efficient use of LEDs, Helland says.

Industrial users of the Argonne and Oak Ridge facilities include Procter and Gamble, which modeled the ways lotions interact with skin, and Pratt and Whitney, which used the machines in the development of more energy efficient jet engines.

New algorithms needed

Titan, in addition to modeling combustion and turbulence, is being used by GE to develop anti-icing surfaces. Masako Yamada, a GE researcher, says that wind turbine blades are one potential application for those surfaces. Her research using molecular dynamics seeks to model the behavior of each individual molecule in a water droplet. Yamada says Titan is capable of modeling about 1 million molecules, still a far cry from what's needed.

"We are many, many orders of magnitude away from representing a true physical science system of the type we'd like to do," Yamada says. She notes that there are 10^{23} molecules in a mole of water. "However, we are far, far ahead of where we used to be even 10 years ago. And to be able to observe the freezing of water in a million molecules is a great advance that was not accessible to us 10 years ago." Even exascale computers won't be powerful enough to model the required number of molecules, she says, so new algorithms and scientific methods also are needed.

Thomas Schulthess, director of the Swiss National Supercomputing Center and a computational physics professor at ETH Zürich's Institute for Theoretical Physics, has a part-time appointment at Oak Ridge and is using Titan to run quantum Monte Carlo simulations of strongly correlated systems. Recent advances in algorithms have made it possible to study the superconducting transition in cuprate high-temperature superconductors. "We are now working on Titan to extract the phase diagram of this model," he says.

Summit "will have a lot more memory so we can think outside the box on how differently to use the machine. We will gain a lot more flexibility. I think the things we do today on Titan will transfer relatively seamlessly to [Summit]," Schulthess says. "I would say it's a profound step forward towards an exascale machine."

Oak Ridge has the existing infrastructure to support the substantial electrical and cooling requirements of supercomputers, says lab director Thom Mason. The IBM machines will draw up to 13 MW, only about 10% more power than the current leaders. That makes the new machines five times as energy efficient as the current top performers.

High-performance machines have limited lifetimes. Fully commissioned in June 2013, "Titan will be on its last legs" by the time Summit is up and running, and it will likely be closed within a year, says Helland. Processors become unstable and unreliable, she explains, and the maintenance required to keep them going becomes cost ineffective.

David Kramer

news notes

ESF regroups. The European Science Foundation is not dead, despite close calls in recent years and reports to that effect over the past months. Instead, in late November the member delegates decided to reconfigure ESF into a leaner, cost-recovering, service-oriented organization.

Based in Strasbourg, France, ESF was founded in 1974 to facilitate research across Europe. Its 66 members from 29 European countries are national funding agencies, research institutions, and

learned societies. The foundation helped create many successful programs and policy initiatives; examples are the European Young Investigators Program and Exploratory Workshops on emerging areas of research. (Photo is from last year's 40th anniversary celebration.)

ESF © BENOÎT LINDER

The new incarnation of ESF has shed its policymaking and research-funding activities so as not to compete with the newer Science Europe, whose membership and mandate overlap with ESF's. In the lead-up to the November decision, for example, the Cooperation in Science and Technology program, which funds meetings, training, and other interactions among scientists, peeled off from ESF to become an independent organization.

ESF will now focus on selling services, namely program management, peer review, and evaluation; clients include national funding agencies, corporate social responsibility funds, and not-for-profit entities. As examples, ESF will continue to coordinate MERIL, an inventory of European research infrastructures, and provide management support for the European Commission's flagship graphene initiative (see PHYSICS TODAY, December 2013, page 22). The foundation also hosts science advisory boards in nuclear physics, marine sciences, space sciences, radio-astronomy frequencies, and materials.

The new scheme is still subject to a financial "viability test," says ESF chief executive Martin Hynes. The organization's name will also be revisited. **TF**

Minorities in physics. African Americans and Hispanics accounted for 2.1% and 3.2%, respectively, of US physics faculty members in 2012 but 13% and 17% of the country's population. Two recent reports by the Statistical Research Center of the American Institute of Physics look at physics trends for underrepresented minorities among faculty and recent physics bachelor's recipients.

Across all disciplines in 2009, African Americans made up 6.6% of faculty and Hispanics 4%. For comparison, Asians—who are not underrepresented in physics—made up 6% of all faculty, and whites 75%.

From 2004 to 2012, the number of African American physics faculty members grew 11% to a total of 190. The number of Hispanic physics faculty members grew 29% to 288. The representation among faculty is similar to that for new doctoral recipients in physics.

In 2012 two-thirds of US physics departments (495 out of 746) had neither African American nor Hispanic faculty members, while 27 departments employed members of both groups.

At the undergraduate level, Hispanics are still underrepresented in the physical sciences, but their numbers are growing fast. From 2002 to 2012, the physical sciences saw a 47% increase in the number of bachelor's degrees awarded; among Hispanics, that rise was 78%. Across all fields in the US over that period, the number of bachelor's degrees awarded grew 38% to more than 1.8 million; among Hispanics that growth was 85%. In 2012, Hispanics earned 342 out of 6177 bachelor's degrees (5.5%) conferred in physics.

For more on these trends, see *African Americans & Hispanics among Physics & Astronomy Faculty* and *Hispanic Participation among Bachelor's in Physical Sciences and Engineering*. The reports are available at http://aip.org/statistics/minorities. **TF**

Postdocs or permanent jobs? Nearly one-third of the 3450 fresh physics PhDs from the classes of 2011 and 2012 in the US went straight to potentially permanent jobs. While that proportion has stayed steady since 2004, the number of PhDs conferred in physics has been rising. "The market for those with knowledge and skills associated with a physics PhD continues to grow," according to *Physics Doctorates One Year After Degree*, a recent report by the Statistical Research Center of the American Institute of Physics. (See http://aip.org/statistics/employment.)

After receiving their degrees, 11% of US citizens and 26% of non-US citizens left the country, mostly for postdoctoral positions. Among those who remained in the US, half of citizens and nearly two-thirds of noncitizens took postdoctoral positions.

In the subfields of nuclear physics and biological physics, more than 70% of new PhDs took postdocs. The percentages were lowest in applied physics and optics and photonics; people in those subfields were more likely to get potentially permanent jobs. **TF** ■