

chemistry. But its main purpose, Bonnet explains, "will be to test the effect of ion propulsion on electrostatic and optical surfaces. We want to master the method [pioneered by NASA]."

Over the next few months, ESA, with the European space sciences community, plans to prioritize proposed projects through 2012. Beyond that, the uncertainty of the budget makes planning meaningless, says Bonnet. However, warns Norway's Bo Andersen, chair-elect of ESA's top science planning committee, "if our budget is further reduced after 2002, this would jeopardize already started missions." Frontrunner cornerstone possibilities include LISA, a joint mission with NASA to detect gravitational waves; GAIA, a successor to Hipparcos, which would make extremely accurate measurements of positions and motions of stars and Solar System bodies; Darwin, which would hunt for Earth-like planets; and an as yet unnamed mission to Mercury.

"In the discussions we have here now, about which missions to carry out, public acceptability looms larger than it used to," notes British Space Centre director Paul Murdin. Indeed, even in Europe, NASA is better known than ESA, a result of the 1969 moonwalk, which made NASA a household word the world over, and the fact that ESA competes with Europe's national space agencies. "One should educate politicians about science," says Italy's Big-nami. "Realistically, one has to come up with appealing results that politicians can understand and appreciate."

### Collaborating carefully

Many technological and scientific challenges lie ahead, says Bonnet. "But the biggest challenge is to do as much science as possible with only 365 million euros a year. And to be original, second to none." The addition of the Mars Express to the Horizons 2000 lineup has increased the near-term pressure on the budget, notes Murdin. So has the problem of financing Cluster 2, a redo of ESA's mission to study Earth's magnetosphere, the first try having failed in 1996 when the Ariane-5 rocket carrying the craft blew up shortly after takeoff. "So two unplanned missions crept into the program," says Murdin.

ESA plans to invest about 170 million euros, or the equivalent of one of its flexible missions, in the NASA-led Next Generation Space Telescope, the successor to the Hubble Space Telescope. But at ESA, enthusiasm for closer collaboration with NASA is guarded. Says the agency's Cavallo, "ESA has made a point not to depend on a collaborator, so that if the partner defaults, the mission can still fly. Now,

## Physics Whizzes Quizzed in Padua

The 30th International Physics Olympiad, held in Padua, Italy, in July, was the largest ever: Nearly 300 high school students from 62 countries competed. The two top individual scores were earned by Konstantin Kravtsov and Serguei Syritsyn of the Russian team, which had the highest marks of any team; Iran was second, and was the only country whose five competitors all won gold medals; the US team came in third; and China placed fourth.

Representing the US were Peter Onyisi of Arlington, Virginia, and Andrew Lin of Wallingford, Connecticut (both second-time olympiad competitors), and Benjamin Mathews of Dallas, all of whom won gold medals, and Natalia Toro of Boulder, Colorado, and Jason Oh of Baltimore, who both garnered silvers.

In the theory exam, students were asked to calculate various parameters for a gas in an expandable cylinder shined on by a laser; the period of oscillation of a magnetic needle in a V-shaped magnetic field and the angle of the V required to distinguish between two theories; and the speed of a

space probe swooping away from an encounter with Jupiter. In the experimental part of the competition, they had to measure properties of a torsion pendulum.

When the students weren't tackling their exams, they visited, among other sights, Venice, nuclear physics experiments at the Legnaro National Laboratories, and Galileo's rostrum at the University of Padua. The city of Padua hosted a hands-on physics exhibition for the public. The idea, says olympiad secretary Giuliana Cavaggioni, "was to make a link in the name of science between the town and young people from all over the world."

Prior to the olympiad, the US team's 24 members (of whom 5 were selected to compete in Padua) gathered in College Park, Maryland, for a training camp (see <http://www.aip.org/physnews/graphics/html/usteam99.html> for profiles and activities of the team members). The American Institute of Physics organized a breakfast for them on Capitol Hill. It was cohosted by Representatives Rush Holt (New Jersey) and Vernon Ehlers (Michigan), both physicists by training, and attended by about a dozen other representatives. With the Elementary and Secondary Education Act scheduled to be rewritten this year, the primary sponsors of the US team, AIP and the American Association of Physics Teachers, along with six other national scientific and teaching societies, used the breakfast to highlight the need for continued federal support for K-12 education.

To draw attention to their message, they sent toy bald eagles to all 535 members of Congress, accompanied by an explanation of the physics of how the toy balances on its beak—its center of gravity is shifted by weights at the wingtips.

The main sponsor of this year's olympiad was Italy's Ministry of Education, with additional support from Italy's Association for Physics Teachers, the University of Padua, municipal and regional authorities, national scientific organizations, business, and other sources. About 18% of the total \$700 000 tab was donated by participating countries.

The 31st International Physics Olympiad will be held in Leicester, England, next summer.

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BERNARD KHOURY/AAPT

AT THE OLYMPIAD CLOSING CEREMONY, the US competitors wait to receive their medals. From left: Jason Oh, Natalia Toro, Andrew Lin, Peter Onyisi, and Benjamin Mathews.



JIM SULLIVAN

THE US PHYSICS OLYMPIAD TEAM breakfasts on Capitol Hill with Vernon Ehlers (at podium) and other congressional representatives.