Sign of spring: Science finalists picked

Ten high school girls and 30 boys last week got the phone calls they've been dreaming about: news that they'd beaten 1,541 other top science students to become finalists in the 57th Annual Westinghouse Science Talent Search.

The next stage of the competition starts March 4, when the finalists face a panel of scientists in Washington, D.C. These judges will interview the students and on March 8 announce the winner of a $40,000 scholarship. Nine other students will receive between $30,000 and $10,000, and the remaining 30 finalists will each be awarded a $1,000 scholarship. Science Service, the publisher of SCIENCE NEWS, administers the competition.

This year's projects ranged widely across disciplines, including a hurricane prediction model, a virtual cricket, and a biochemical analysis of why Korean *mandu* dumplings turn bright red during cooking. One student examined current efforts to control loosestrife, an invasive weed, by introducing a predator and discovered a ladybug that preys on the newcomer. Another finalist, who reads Russian and Ukrainian, as well as French, developed a computer model for studying how children learn languages. Five math projects made the finals, as did an astronomy study of time dilation and redshift in cosmic gamma-ray bursts.

"I think we should be very encouraged because at this very high level we are producing in America today students of extraordinary talent," says Princeton University astrophysicist J. Richard Gott, who heads the judging panel.

The 40 finalists are:

• Arizona: Ravi Vikram Shah, Corona del Sol H.S., Tempe.

• California: Ann Kromsky, Corona H.S., Corona; James Greg Marsden, North Hollywood H.S., North Hollywood; Sohini Ramachandran, Rio Americano H.S., Sacramento; Jeremy Walter Shaw, Villa Park H.S., Villa Park.

• Colorado: Heather Margaret Matthews, William J. Palmer H.S., Colorado Springs.

• Delaware: Calvin K. Huang, Salesianum School, Wilmington.

• Florida: Carey Marie Tanner, Canterbury School, Fort Myers; Kimberly Anne Fitzgerald, Gulliver Preparatory School, Miami; Aaron M. Seider, North Miami Beach Senior H.S., North Miami Beach.

• Illinois: Travis Jeremy Schedler, Illinois Math & Science Academy, Aurora.

• Indiana: Christopher Colin Mihelich, Park-Tudor School, Indianapolis.

• Maryland: Kirk Doran, Walt Whitman H.S., Bethesda; Josh Evan Greene, Oakland Mills H.S., Columbia; Sabyasachi Guharay, Wilde Lake H.S., Columbia; David Jacob Wildstrom, Montgomery Blair H.S., Silver Spring.

• Michigan: Cheryl Kyung Kim, Detroit Country Day School, Beverly Hills.

• Minnesota: William J. Greenleaf, Mayo H.S., Rochester.

• New Mexico: Stephanie Lynn Levine, Eldorado H.S., Albuquerque.

• New York: Grace Yew-Mih Lee and Keith Jarred Rotbard, Lawrence H.S., Cedarhurst; Mark Evan Abraham, Jamesville-Dewitt H.S., Dewitt; Ameet Shrirang Talwalkar, Half Hollow Hills H.S., Dix Hills; Jeremy C. Hwang, Great Neck South H.S., Great Neck; Michael Joseph Smolow, John L. Miller Great Neck North H.S., Great Neck; Parker Rouse Conrad, Collegiate H.S., New York; Jesse Keith Anttila-Hughes, Stuyvesant H.S., New York; Jonathan Adam Kelner, The Wheatley School, Old Westbury; Christopher Michael Gerson, Grace Ann Lau, Clyde Law, and Thomas Petersen, Ward Melville H.S., Setauket; Mark Anthony Grishaj, Ramapo Senior H.S., Spring Valley; Steven Mark Tobias, Syosset H.S., Syosset.

• Oklahoma: Michael Yanche Lee, Norman H.S., Norman.

• Texas: Patrick William Goodwill, Texas Academy of Math & Science, Denton; Stephen Alexander Tinnin, McKinney H.S., McKinney.

• Virginia: Paul Julius Bracher, David Hayes Marcus, and Mary Ellen Matyskiela, Thomas Jefferson H.S. for Science and Technology, Alexandria. —*S. Milius*

Spotting a sparse crystal of trapped ions

The neatly arranged atoms or ions that make up an ordinary crystalline solid are typically separated from their neighbors by less than 1 nanometer. Now, researchers have produced an array of regularly spaced ions that are at least 100,000 times farther apart yet still have the orderly arrangement expected of a crystal.

Wayne M. Itano and his coworkers at the National Institute of Standards and Technology in Boulder, Colo., obtained evidence of such a pattern in a rapidly rotating cloud of nearly 1 million ions confined in a special trap. They report their findings in the Jan. 30 SCIENCE.

The NIST team is the first to observe this simple crystalline state in the laboratory, says John P. Schiffer of Argonne (Ill.) National Laboratory.

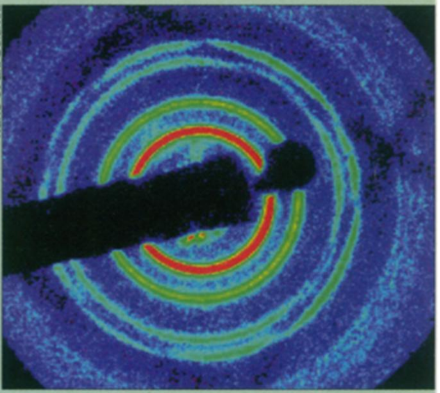
The researchers used a combination of magnetic and electric fields to trap the million beryllium ions at a temperature of less than 10 millikelvins. Settling into a roughly spherical cloud about 1 millimeter in diameter, the ions constitute what is called a one-component plasma. The magnetic field also causes the entire cloud to spin at about 100,000 rotations per second.

Laser light directed at the cloud is scattered into a distinctive diffraction pattern of concentric rings, suggesting that the ions form an equally spaced geometrical array—in other words, a single crystal.

The NIST scientists developed a method for precisely controlling the cloud's spin so as to synchronize it with pulses of laser light and thus obtain a diffraction pattern of individual spots. "You see nice square lattices," Itano says.

In much earlier experiments, researchers had confined many fewer particles in a trap and found that the ions settled into a set of concentric spherical shells (SN: 7/30/88, p. 69). The new NIST results show that with a sufficiently large number of ions, at least those in the interior fall into a cubic pattern.

"We're studying various properties of these crystallized ion plasmas, now that we can image them and control the rotational frequency," Itano says. Plasma crystals may prove useful as a model of a neutron star's crust, for example, aiding efforts to determine the ages of these stars. —*I. Peterson*



Itano et al./SCIENCE

Laser light diffracted by an array of beryllium ions produces a pattern of bright spots that are smeared into rings by the rotation of the ion cloud within the trap. The shadow of a laser beam deflector masks part of the image.