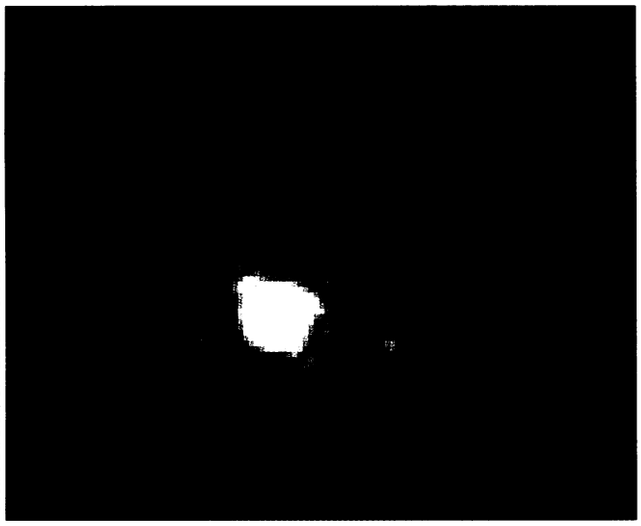
Hubble telescope eyes a Milky Way squirt

Casting its cosmic eye relatively close to home, the Hubble Space Telescope has imaged one of the tiniest stars ever recorded. Dubbed Gliese 623b, this Milky Way resident is only one-tenth as massive as the sun and shines but a sixty-thousandth as brightly.

Further observations should show whether the small object is a dim, ordinary star, known as a red dwarf, or a brown dwarf — an extremely faint class of star that has so far eluded detection. Brown dwarfs don't have enough mass to burn hydrogen, the nuclear fuel that keeps stars glowing well into middle age.



Cesare Barbieri, U. Padua/NASA/ESA

False-color image obtained by Hubble shows tiny star Gliese 623b (bright spot right of center) as it orbits its larger companion, Gliese 623a.

"This star is right at the border — it could be a red dwarf, or it could be a brown dwarf," says Duccio F. Macchetto of the European Space Agency (ESA) and the Space Telescope Science Institute in Baltimore. "We don't have enough data [yet] to distinguish between the two."

Two features of the diminutive star, which lies 25 light-years from Earth in the constellation Hercules, have prevented ground-based telescopes from detecting it. The star shines too faintly, and it lies too close to a bigger, brighter companion. Even if Gliese 623b resided as close to Earth as the sun does, it would have only eight times the brightness of the full moon.

A telltale wobble in the orbit of the larger star, now known as Gliese 623a, had previously betrayed the presence of its tiny partner. Last June 11, Hubble's faint-object camera became the first detector to record this unseen companion. NASA released the image late last month.

The small star lies only about 320 million kilometers from the bigger body — or twice the distance between Earth and the sun — and takes an estimated 4 years to orbit it. Observations taken over a year or so should better determine the mass of Gliese 623b and whether or not it qualifies as a brown dwarf, Macchetto says.

"I'm more involved in getting images of distant galaxies," the astronomer adds, "but I'm glad to get an image of such a small, nearby star."

— R. Cowen

Physicists spot element 111

Santa brought a team of research physicists in Darmstadt, Germany, an early Christmas gift: element 111. On Dec. 20, 1994, scientists at GSI, the center for heavy ion research, announced that they had detected three atoms of the new element. With 111 protons and 161 neutrons, this lab-made element has the highest atomic number seen so far.

To create element 111, the physicists bombarded bismuth atoms, which have 83 protons, with a beam of nickel atoms, which contain 28 protons. Signals from three atoms of element 111 appeared for less than two-thousandths of a second. The atoms then decayed into lighter elements.

During decay, one of the atoms gave rise to a daughter element 109, with an atomic mass of 268, and a granddaughter element 107, with a mass of 264. Scientists had never before observed these two isotopes. The discovery of element 111 caps a remarkable season for the Darmstadt lab, which in November found element 110 (SN: 11/26/94, p.356).

"They used the same system to discover element 111 that they used for element 110," says Albert Ghiorso, a physicist at the Lawrence Berkeley (Calif.) Laboratory. "They just changed the target from lead to bismuth, adjusted the energy level, and lo and behold, there it was."

— R. Lipkin

Swimmers may get hefty chloroform dose

Most swimmers stroke away lap after exhausting lap — summer and winter — for their health. But a new study suggests that those who frequent pools may pick up more than improved muscle tone. They could suffer — mostly through inhalation — high exposures to chloroform, a carcinogen formed when chlorine reacts with organic water pollutants.

Chloroform belongs to a class of chlorination by-products, known as trihalomethanes (THMs), that municipalities attempt to limit in drinking water. For 1 week, Benoît Lévesque of the Centre de Santé Publique de Québec in Ste-Foy and his coworkers monitored chloroform — the most common trihalomethane — in a Quebec pool.

Because exercise increases one's breathing rate — and therefore exposure to any air pollutants — the researchers assayed chloroform in the breath of 11 men before, 35 minutes into, and after an hour-long daily swim. Following each swim, they raised the water's chloroform concentration.

Previously, other researchers had recorded increases in chloroform concentrations in bathers' lungs of roughly 2.7 parts per billion (ppb) after a 10-minute shower in chlorinated water. In the just-published December Environmental Health Perspectives, Lévesque and his coworkers now report that an hour's swim can greatly boost chloroform concentrations — from a starting average of 52.6 ppb in the lungs before swimming to between 100 and 1,093 ppb afterward.

Though the changes reflect the intensity of a swim somewhat, Lévesque traced most of the average daily variation to differences in the amount of chloroform in the pool and the air above it. Moreover, the chemical's concentration in the pool did not exceed Canadian drinking-water standards on most of the test days.

While only preliminary, Lévesque says, his team's new findings — based on conditions that prevail in many pools — suggest typical drinking-water standards for THMs "may not afford protection to all segments of the population, especially swimmers."

— J. Raloff