# Spotting the Milky Way's enigmatic center

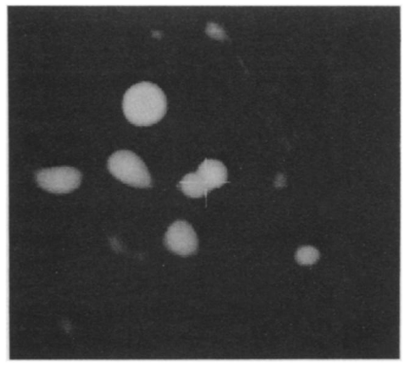
Two tiny spots of light may hold the key to unlocking the mystery of the Milky Way's center. These celestial objects, detected by astronomers using the European Southern Observatory's New Technology Telescope (NTT) at La Silla, Chile, lie very near the position of a source of intense radio waves in the southern constellation of Sagittarius, in the direction of the galactic center.

The discovery marks the first identification of visible objects at the radio source's position. Careful study of the light emitted by these objects, provisionally designated GZ-A and GZ-B, may enable astronomers to determine whether a black hole or a compact cluster of hot, young stars lies at the heart of the Milky Way.

To obtain a clear image of the galactic center, Michael R. Rosa of the European Southern Observatory in Garching, Germany, and his collaborators adopted a novel strategy for penetrating the dense interstellar gas and dust clouds that otherwise obscure the view. They decided to make their observations at wavelengths ranging from 850 to 1,100 nanometers. At these wavelengths, about one-millionth of the light emitted by any sources present would penetrate the surrounding clouds – sufficient light for the NTT to obtain an image.

Using a variety of image-processing techniques, the astronomers combined five 40-minute exposures to create one sharp optical image. That allowed them to see that one of two relatively bright stars in the picture appeared elongated, clearly indicating the presence of other, fainter images nearly coincident with that of the bright star. Further processing subtracted the bright star's image, unveiling two closely spaced, previously unknown star-like objects.

GZ-A lies closer to the galactic center's radio source, about 28,000 light-years from Earth. It looks quite blue, suggesting a large energy output, and apparently shines with an intensity a few million times greater than the sun's. It also seems to produce very little infrared radiation, whereas GZ-B appears to coincide with a known source of infrared radiation.



*Computer-processed image shows a pair of star-like objects (cross) at the Milky Way's center, known as GZ-A (lower left) and GZ-B (upper right).*

Rosa and his colleagues speculate that GZ-A could be an extremely dense cluster of hot stars. However, it's also possible that one or both of the objects are associated with a black hole at the galactic center. Spectroscopic studies of the light emitted by the two objects may indicate which idea is correct.

*– I. Peterson*

# U.S. stalls on establishing $CO_2$ limits

The United States resisted calls to make a specific commitment on the issue of global warming at an international meeting last week in Geneva, Switzerland, and now finds itself the only wealthy Western nation that has not agreed to stabilize its emissions of carbon dioxide by the turn of the century.

In the weeks leading up to the Second World Climate Conference, 18 Western European nations, Japan, Australia, New Zealand and other countries announced their intention to stabilize carbon dioxide emissions. But in drafting the conference's final declaration, U.S. negotiators blocked attempts to insert specific timetables for industrialized nations to limit those emissions, the primary cause of global warming.

The action drew criticism from environmentalists and from many countries that had hoped the conference would generate a strong international statement before negotiations on a global climate treaty begin in February. Diplomats aim to have the treaty ready in time for the United Nations Conference on Environment and Development in June 1992.

During the Geneva meeting, which began Oct. 29, scientific experts from around the world gathered to discuss the state of knowledge regarding global warming. Their final declaration concludes that "notwithstanding scientific and economic uncertainties, nations should now take steps toward reducing sources and increasing sinks of greenhouse gases through national and regional actions."

However, according to John Knauss, head of the National Oceanic and Atmospheric Administration and the lead U.S. delegate to the conference, the United States is not prepared to set specific targets on carbon dioxide emissions, although it is implementing programs that would slow the rising trend in emissions levels.

The U.S. position contrasts with that of other Western industrialized nations, which have agreed to stabilize or reduce their carbon dioxide emissions. Many of these countries maintain they can achieve reductions without substantial costs to society. Other industrialized nations have opposed adopting emissions limits. These include the Soviet Union, beleaguered by a failing economy, and China, with relatively low *per capita* emissions of carbon dioxide.

The debates at the meeting foreshadowed the problems facing those attempting to frame an international agreement in the next two years. "I realize the difficulty of the negotiating process, given the wide variety of views among the different countries of the world," says conference coordinator Howard Ferguson of the Geneva-based World Meteorological Organization, one of six international organizations sponsoring the 138-nation meeting.

Yet the conference and the deadlines recently set by some nations left many hopeful for the prospects of a treaty. "It's not going to happen overnight, but this international process has a lot of momentum right now," says Rafe Pomerance of the World Resources Institute in Washington, D.C. *– R. Monastersky*

# STM tip builds golden mounds

Physicists have devised a simple and speedy method for creating microscopic images and characters. Their new technique – using a scanning tunneling microscope (STM) to deposit tiny gold mounds onto gold or platinum surfaces – brings scientists one step closer to making near-molecular-scale electronic devices.

In recent years, many groups have sought to manipulate increasingly small clusters of atoms, with the ultimate goal of making tiny circuits and data storage devices. The STM has proved a helpful tool. Invented in 1981, the instrument works by positioning a tiny metal tip within a few atomic diameters of a surface, close enough to allow electrons to leap, or "tunnel," across the air gap to the surface. The resultant current varies with the width of the gap, allowing scientists to chart surface bumps and grooves as small as individual atoms (SN: 4/1/89, p.200).

Dan Rugar, H. Jonathon Mamin and Peter H. Guethner at the IBM Almaden Research Center in San Jose, Calif., wondered whether they could somehow release clusters of atoms from an STM tip and deposit them onto a surface. "I had the idea that if we could apply [an external] voltage to the tip, we could get some atoms to be emitted," says Rugar.

Scientists have long known that a