Astronomy

Blocking light to get a sharper image

When it comes to getting the sharpest possible image of a heavenly object, the rule of thumb is, the bigger the telescope mirror, the better. However, some astronomers now have taken the opposite tack.

To examine the dusty environs of a large, bright star and its partner in unprecedented detail, the astronomers masked more than 95 percent of the mirror on the largest visible-light telescope in the world, the Keck I Telescope atop Hawaii's Mauna Kea.

The hot, massive star, known as Wolf-Rayet 104, is about 3 times the size of the sun and about 25 times its mass. At 4,800 light-years from Earth, it lies too far away for conventional observation techniques to yield a sharp image.

Instead, Peter G. Tuthill of the University of California, Berkeley and his colleagues blocked most of the light from Keck I, creating 36 small, circular regions within the mirror—effectively 36 small telescopes. The light waves from the circles interfere with each other.

Just as a collection of radio telescopes records intensity patterns arising from interference between signals reaching each detector, so the masked Keck telescope yields a pattern of light and dark bands. This technique dramatically reduces blurring from atmospheric turbulence.

After reconstructing a near-infrared picture from the bands, the researchers found that a dusty spiral tail surrounds the star and its hot, though less massive, companion star. The tail poses a puzzle, because both stars radiate so much high-energy light that astronomers had expected dust grains to burn as soon as they formed.

Tuthill and his Berkeley collaborators, William C. Danchi and John D. Monnier, suggest that a cocoon of cooled, compressed material forms in the region where the fierce winds from each star collide. This cocoon shields the dust, enabling it to survive.

The spiral pattern results from the rotation of the two-star system as dust flows straight out from the center, like water spewing from a lawn sprinkler. The astronomers describe their work in the April 8 NATURE. —*R.C.*

Galaxies at even greater distances

Researchers have found the most distant body measured to date, a galaxy 14.25 billion light-years from Earth. The light that reached the Hubble Space Telescope's imaging spectrograph in 1997 left the galaxy when the universe was just 5 percent of its current age, says Kenneth M. Lanzetta of the State University of New York at Stony Brook. He and his colleagues describe the find in the April 15 NATURE. The astronomers have also found two other galaxies whose colors indicate that they are even more distant.

The relative brightness at several different wavelengths of the first galaxy hinted at its extreme distance, Lanzetta notes. Spectra taken last year by the Hubble instrument confirmed that the galaxy, located in a region adjacent to the Hubble Deep Field North, has a redshift of 6.68. This means it is so distant that the expansion of the universe stretches the light the galaxy emits by a factor of 6.68.

Lanzetta told SCIENCE NEWS that his team used a combination of ground-based and Hubble images to find the other two galaxies. Although the group has not directly measured the distances, the researchers estimate that one galaxy has a redshift of 8 and lies 14.4 billion light-years from Earth; the other a redshift of 10 and lies 14.6 billion light-years away.

All three galaxies are unexpectedly bright and are making stars at a prodigious rate, equivalent to a few dozen suns per year. Lanzetta suggests that these characteristics are at odds with the standard theory of galaxy formation, which holds that the most distant galaxies should be faint and make few stars. —*R.C.*

Biomedicine

From Orlando, Fla., at a meeting of the American Heart Association

Chinese supplement lowers cholesterol

The controversial diet supplement Cholestin works, according to two scientific studies funded by the company that markets the supplement. The red yeast, which is fermented on rice and gives Peking duck its characteristic color, is a traditional Chinese health food believed to promote heart function.

In a Chinese study, total blood cholesterol decreased by 26 percent in 35 patients given Cholestin, and by just 7 percent in 35 people given a placebo, reports Joseph Chang of Pharmanex in Simi Valley, Calif. Study participants had an average of about 225 milligrams of cholesterol per deciliter of blood (mg/dL)—high enough that many U.S. physicians would recommend dietary changes but not so high that patients would typically be placed on cholesterol-lowering drugs.

In a study conducted at 12 medical centers in the United States, 116 men and 71 women were given Cholestin for 8 weeks. They showed a 16 percent drop in total blood cholesterol concentration, from an average of 242 mg/dL to 204 mg/dL, according to James M. Rippe of Tufts University School of Medicine in Boston, who is a scientific advisor to Pharmanex. Four weeks after discontinuing the supplement, cholesterol concentrations of the participants returned to prestudy values.

This multicenter trial "shows that even in a real-world situation, in 12 sites not devoted to research, there is a rather significant reduction in cholesterol," says Rippe.

Cholestin contains compounds that inhibit the key enzyme responsible for producing cholesterol in the body, including a naturally occurring form of the active ingredient in the anticholesterol drug lovastatin. Participants in the Chinese trial received about 13.5 mg of these active compounds daily, while those in the U.S. test received about 9.6 mg/day.

"The results of these two studies are promising. In the future, the red yeast rice may provide clinicians with another tool to lower cholesterol," says Thomas A. Pearson of the University of Rochester (N.Y.) School of Medicine, a spokesperson for the American Heart Association. Over the long term, however, the supplement might not be as safe as currently approved drugs for lowering cholesterol, he cautions.

Last year, the Food and Drug Administration tried—ultimately unsuccessfully—to classify Cholestin as a drug and remove the supplement from the market (SN: 2/27/99, p. 132). —*D.C.*

Bad attitude may be bad for the heart

The more hostility people show in their behavior and attitudes, the more likely they are to have calcium deposits in the arteries of their hearts, a new study finds. Such calcium deposits are early signs of atherosclerosis, also called hardened arteries, which can lead to high blood pressure and heart attacks.

Researchers led by Carlos Iribarren of Kaiser Permanente's research division in Oakland, Calif., divided 376 men and women aged 18 to 30 into two groups according to assessments of their hostility. Volunteers were characterized as hostile if they had a cynical view of the world and aggressive responses to stressful situations.

The more hostile participants were two and a half times more likely than the less hostile participants to have calcium deposits in their heart arteries. The hostile subjects were also more than nine times as likely to have enough calcium deposits in their arteries to indicate the beginnings of fatty plaques, hallmarks of atherosclerosis, says Iribarren.

The link between hostility and the early signs of heart disease held true even after the researchers took into account differences in education, weight, smoking, and blood pressure. Since the study participants were relatively young, few showed even early signs of heart disease, so larger and longer studies are needed to strengthen the link, Iribarren says. —*D.C.*