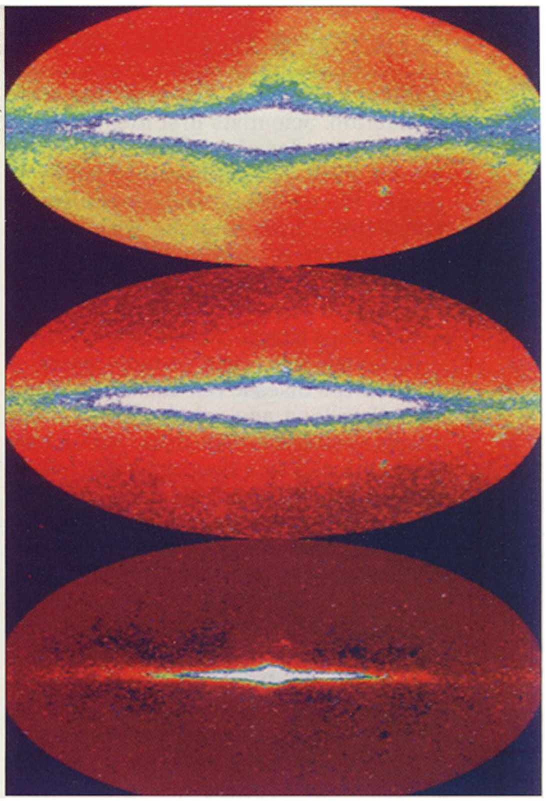
Sky map captures cosmic star glow

The faint glow of a new sky map paints a portrait of starlight over the history of the universe. The picture primarily depicts emissions from cool, relatively lightweight stars, which constitute the majority of stars in the cosmos.

Recorded at a near-infrared wavelength of 3.5 micrometers (μm), the map fills a gap in measurements of the light that different stellar populations contribute to the overall brightness of the sky, says Eli Dwek of NASA's Goddard Space Flight Center in Greenbelt, Md. Previous maps, recorded at shorter wavelengths, depict emissions from the relatively small number of hot, massive stars, which radiate most of their light in the ultraviolet and quickly die out.

Dwek and Richard G. Arendt of Raytheon STX at the Goddard Space Flight Center constructed the new map using data gathered by the Cosmic Background Explorer satellite. They describe their study in the Nov. 20 ASTROPHYSICAL JOURNAL LETTERS.

To estimate the amount of starlight from outside our galaxy, the researchers had to subtract two local sources of infrared emission: dust and stars within the Milky Way. Light scattered by solar system dust had already been removed. Dwek says the amount of extragalactic starlight they deduce is slightly higher than had been predicted by models using shorter-wavelength observations.



Dwek, Arendt/NASA

Maps of the sky, recorded at a wavelength of 3.5 micrometers. Bright, central band in top image represents light from Milky Way stars; yellow curves show emission from solar system dust. To construct the central image, radiation from solar system dust was subtracted. In the bottom image, most of the radiation due to Milky Way stars and dust has also been subtracted, making more visible the radiation from extragalactic stars.

The new detection thus provides a more accurate estimate "of the total amount of energy that was released into the universe by starlight and not absorbed by dust," Dwek asserts. Astrophysicists believe that stars emit much less light at wavelengths longer than 3.5 μm, he notes. Combined with previous studies (SN: 1/10/98, p. 20), the new finding suggests that dust absorbs at least half of all starlight, he says.

The total amount of light emitted by stars and the fraction absorbed by dust trace the formation and structure of galaxies, says Dwek. Researchers continue to argue about the distances between Earth and most of the stars that contribute to the sky background. In a paper accepted for future publication in ASTROPHYSICAL JOURNAL LETTERS, Martin Harwit, an astrophysicist in Washington, D.C., contends that most of the starlight comes from galaxies residing no more than about 8 billion light-years away. *—R. Cowen*

Laser interplay stokes fusion uncertainty

Fusion researchers are skewering laser beams with laser beams to see how the interactions might affect laboratory efforts to spark nuclear fusion. Two research groups this week report that crisscrossing lasers can squander or misplace energy that fusion labs will need to set off wee thermonuclear blasts.

Many beams will intersect in a pair of billion-dollar lasers to be built in the next decade. The 192-beam National Ignition Facility at Lawrence Livermore (Calif.) National Laboratory (LLNL) and the 240-beam Laser Megajoule at Bordeaux, France, will support nuclear weapons and energy research (SN: 10/19/96, p. 254). Fired into the ends of a gold cylinder containing a BB-size hydrogen fuel pellet, overlapping beams will generate heat. This heat creates a uniform bath of X-rays that will implode the pellet.

The beams also rip electrons from gas molecules inside the cylinder, creating a hot cloud of electrons and ions, or plasma, which sometimes reflects beams away or otherwise interferes with target illumination.

In experiments that overlap two or three beams in a plasma, researchers found an unexpected rise in stimulated Raman scattering, an energy-sapping laser-plasma interaction. "This is very bad for fusion," says team leader Christine Labaune of the École Polytechnique's intense laser laboratory in Palaiseau, France, who worked with researchers from LLNL and the University of Alberta in Edmonton. However, another undesirable interaction diminished.

Labaune described her findings this week at the annual meeting of the Division of Plasma Physics of the American Physical Society (APS) in New Orleans.

At the same meeting, a team of U.S. government, university, and private scientists reported that, under some conditions, about one-tenth of a beam's energy can leap to a sister beam when identical-wavelength lasers intersect in a plasma. Slightly tweaking laser colors will probably make the problem moot, explains Kenneth B. Wharton of LLNL, who led the team. Otherwise, such energy shifts could cause uneven pellet irradiation and a fusion fizzle, he says.

Understanding multiple-laser effects is vital since interactions such as Raman scattering pose a challenge to laboratory fusion, says Barrett Ripin of APS in College Park, Md., who heads a committee that advises LLNL on laser fusion. However, the problem of energy transfer between beams described in Wharton's "beautiful piece of scientific work" seems surmountable, he adds. *—P. Weiss*

Birds prefer walls for wild flirting

During courtship, female spotted bowerbirds like a guy to get wild—charging into walls and flinging around bleached bones—but they also prefer to watch the show from behind a see-through barrier.

Males of this robin-size Australian species weave parallel walls in the clearings where they strut their stuff for visiting females. Rearranging these bowers provides new clues to the birds' mating dynamics, report Gerald Borgia of the University of Maryland in College Park and Daven C. Presgraves of the University of Rochester (N.Y.). In the November ANIMAL BEHAVIOUR, they argue that their first experimental redesign of bowers supports the idea that courtship features evolved to let males act wildly enough to be alluring without scaring females away.

The spotted bowerbird, *Chlamydera maculata*, is the only one of the bower builders to align the walls east-west instead of north-south. Also unique is the female's viewing position within the bower. She watches the male's show through a wall, which is of an unusually loose weave, instead of through an open end.

It's quite a show too, more intense than