Plethora of quasars

Still in its infancy, one of the most ambitious surveys of the heavens ever conducted has already proven its mettle. Observations taken during the first few months of the Sloan Digital Sky Survey, which will ultimately generate a detailed map of one-quarter of the sky, have revealed 12 distant quasars, including the most remote of these brilliant beacons yet discovered.

The new record holder has a redshift of 5.0, a measure of an object's distance from Earth. The newly found quasars all hail from a time when the cosmos was less than a billion years old.

Two of the other new finds rank as the second and fourth most distant quasars ever observed. Xiaohui Fan of Princeton University announced the detections Dec. 4 at the Fermi National Accelerator Laboratory in Batavia, Ill.

The findings, culled from just 1 percent of the data expected from the planned 5-year survey, prove "we can nail high-redshift quasars," says Sloan researcher Michael S. Turner of Fermilab and the University of Chicago. "At this rate, by the end of the survey we will have almost 1,000 quasars with redshifts greater than 4.7. Before Sloan, there was only one!" he notes. The survey promises to find the 100,000 brightest quasars, nearly 30 times the current number.

As of early December, a radio survey covering the same patch of sky that Sloan is examining in visible light has found 57 previously unknown quasars, Richard L. White of the Space Telescope Science Institute in Baltimore told SCIENCE NEWS. Known as FIRST (Faint Images of the Radio Sky at Twenty-centimeters), the survey uses the Very Large Array, a bank of telescopes near Socorro, N.M.

Early results from the Two-Micron All Sky Survey (2MASS), which examines the sky in near-infrared, have revealed 53 quasars unobserved in visible light, Brant O. Nelson of the California Institute of Technology in Pasadena reported this month at a meeting of the American Astronomical Society in Austin, Texas. Infrared light, unlike visible light, easily penetrates dust. The findings thus suggest that many quasars lie hidden behind dust shrouds, Nelson says. —*R.C.*

Asteroid rendezvous: Better luck next year

On Dec. 20, the NEAR (Near Earth Asteroid Rendezvous) spacecraft fired its main engine to keep on track for a Jan. 10 meeting with a hunk of rock called 433 Eros (SN: 1/2/99, p. 7). In seconds, the craft lost contact with Earth and the firing aborted.

During the 27 hours it remained incommunicado, NEAR expended some 25 kilograms of fuel to maintain its proper orientation. As a result of these mishaps, the craft's year-long scrutiny of the asteroid will be postponed for 13 months. NEAR won't meet up with Eros until Valentine's Day, 2000.

On Dec. 23, NEAR took low-resolution images and spectra of Eros as the asteroid sped past at a distance of 4,000 km. The images reveal a large crater that spans more than one-fifth the total length of the asteroid. Eros appears to be slightly smaller than had been estimated. From the Dec. 23 flyby, researchers are attempting rough calculations of the asteroid's mass and volume. Preliminary results suggest that unlike the asteroid 253 Mathilde, which NEAR briefly visited last year, Eros has too high a density to be a rubble pile, says NEAR scientist Donald K. Yeomans of NASA's Jet Propulsion Laboratory in Pasadena, Calif. —*R.C.*