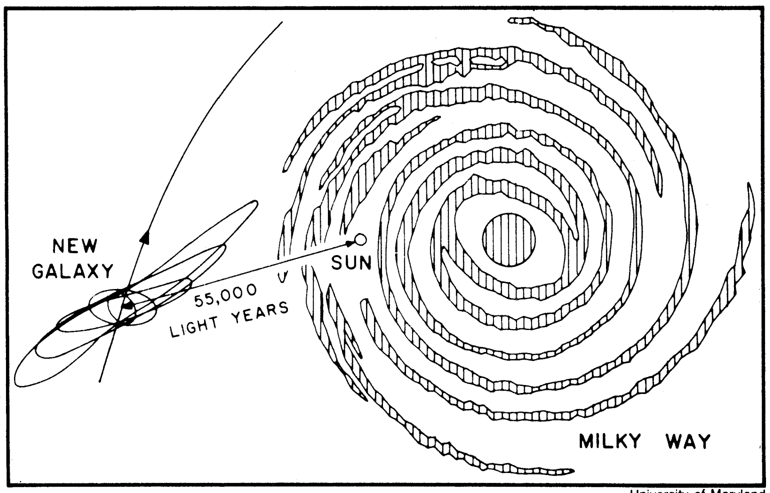
Looking for Mr. Goodgalaxy



University of Maryland

Newly discovered galaxy is nearest one to our own Milky Way. Gravitational effects of our galaxy are distorting its shape and tearing off its outer parts.

Astronomy is the science of surprises. While observers were mostly riveting their attention on the most distant galaxies for cosmological reasons, a new one has been found so close to our own Milky Way that it is almost touching it. The discovery is by S. Christian Simonson of the University of Maryland and is reported in the Nov. 1 ASTROPHYSICAL JOURNAL LETTERS (which had not yet appeared at the time of this writing).

The finding is a dwarf galaxy that, although it has always been there, is obscured from sight by the thickness of the Milky Way itself. Simonson found it through an anomaly in the hydrogen maps of its part of the sky, the constellation Gemini, where matter associated with the little galaxy covers an area 10 by 45 degrees. "For six years I had been noticing this funny thing on the maps," he says. "After attending a conference on galaxies in Paris last fall, it occurred to me it must be from a galaxy."

Calculations on the University's Univac 1108 computer indicated the anomalous hydrogen was coming from a dwarf galaxy that was disrupted by the gravitational field of the Milky Way. The newly found galaxy is so close as to be almost touching the Milky Way, about 55,000 light-years from the sun. The figure has an uncertainty of 20 percent, which will not be resolved until individual stars are distinguished in the new galaxy. The nearest previously known galaxies are the two Magellanic Clouds, 180,000 and 200,000 light-years away. The new galaxy has only about a thousandth the mass of the Milky Way.

Simonson figures that the dwarf galaxy will make its closest approach to the Milky Way in about 78 million years and then start back into intergalactic space, leaving behind half its original mass and retaining only 20 percent of its original size.

Associates of Simonson have named the new galaxy Snickers because it is peanuts compared with the Milky Way. □

Evidence for a new quantum number

Particle physicists are running out of names for quantum numbers. Quantum numbers are properties that physicists assign to particles to sort out the processes (radioactive decays and other interactions) that do happen from those that might, but don't. Each quantum number has a conservation law that states either that the amount of it present may not change or that under particular circumstances it may change by a certain amount. Keeping books on the quantum numbers allows the physicists to sort out allowed processes from forbidden ones.

Results of a neutrino experiment done at the Fermi National Accelerator Laboratory lead the experimenters to suggest the existence of a new particle, the behavior of which points to the existence of yet another quantum number. The events in question involved high-energy neutrinos that struck iron or liquid targets and produced pairs of negative muons. The experiment is operated by Alberto Benvenuti of the University of Wisconsin and 11 others from the University of Wisconsin, Harvard University, the University of Pennsylvania and FermiLab. Two papers in the Nov. 3 PHYSICAL REVIEW LETTERS deal with the work.

Attempts to deduce the details of the interaction indicate that the neutrino collisions produced one or more real, short-lived intermediate particles, which then decayed into the two negative muons and apparently either another neutrino or a positive muon. The properties of the events suggest that these new particles belong to the class called hadrons. If these hadrons decay into muons, they must do so under the governance of the forces of the weak interaction. For that to happen, the experimenters conclude, requires a new quantum number to add to those already existing (electric charge, spin, hypercharge, baryon number, lepton number, strangeness, color, charm, etc.).

The new quantum number would not be conserved by the weak interaction (thus, it could change its amount from one to zero in weak-interaction processes), but would be conserved in electromagnetic or strong-interaction processes. The new quantum number accounts for the prevention of the new hadron's decay by either of the latter classes of process. No name for the new quantum number is as yet proposed. □

Lunar dust, earthly ice and the galaxy

The recent theory that the timing of ice epochs on earth has been determined by the solar system's passage through the "dust lanes" of its galaxy has now received some tentative support from the moon.

A number of researchers have long held that terrestrial ice ages could have been triggered by the sun's passage through regions of exceptionally dense interstellar dust. The influx of dust to the sun, the idea goes, would have caused temporary increases in the sun's brightness, leading to increased precipitation on earth, a major factor in spreading glaciation. More recently it has been suggested that the dark spaces between the bright spiral arms of the galaxy may be just such concentrations of dust. British astronomer W.H. McCrea of the University of Sussex has proposed that the sun's journey through the dust lanes could have been the factor responsible for spacing the ice ages at intervals on the order of 100 million years (SN: 7/12/75, p. 23; 8/16/75, p. 89).

Now a pair of U.S. researchers have reported that soil samples brought back from the moon by Apollo astronauts reveal increases in dust particles of the proper sizes and masses, dated at roughly the same spacing. John F. Lindsay of the Marine Science Institute at the University of Texas in Galveston and L.J. Srnka of the Lunar Science Institute in Houston report in the Oct. 30 NATURE that a deep core sample from the Apollo 15 mission has yielded "three near-cyclical enhancements . . . superimposed on the drill core stratigraphy."

In seeking evidence of long-ago passage through the dusty galactic arms, the scientists first noted the numbers and masses of lunar soil particles produced on surface samples by the present level of bombardment by dust-sized (44 to 177 micron) meteorites. Then they looked in the depths of the core sample for layers in which there were increased numbers of