New investigation by UCSD astronomer questions the distance, cosmological use of quasars

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Media Contact: Mario Aguilera, (619) 534-7572, mcaguileragucsd.edu NEW INVESTIGATION BY UCSD ASTRONOMER QUESTIONS THE DISTANCE, COSMOLOGICAL USE OF QUASARS

Since they were discovered more than 35 years ago, science has largely accepted the idea that quasars since they are thought to be great distances from us could be used as cosmological tools to study the properties of the universe. Many astronomers have thought of quasars as windows to the history of our expanding universe.

Striking new results announced today by Margaret Burbidge, university professor of astronomy in the Physics Department of the University of California, San Diego, show that these conventional views of quasars may not be correct.

At this morning's session of the 193rd American Astronomical Society meeting in Austin, Texas, Burbidge will present data that suggest a group of quasars aligned in the sky with galaxy NGC 1068 are much closer to Earth than previously believed. The study provides evidence that the quasars are in fact physically associated with NGC 1068 and it appears they have been ejected from the galaxy like cannonballs.

"This paper provides evidence that quasars are not at great distances from us, and thus cannot be used for cosmological investigations," said Burbidge, a member of the Center for Astrophysics and Space Sciences at UCSD and a faculty member since 1962.

Using data from the Lick Observatory outside of San Jose, Burbidge studied the group of quasars aligned across and around NGC 1068, a bright galaxy relatively close at 30 million light years away. Traditional ideas in astronomy argued that each NGC 1068 quasar, because its observational spectra shifts strongly toward the red end of the spectrum, or "redshifts," must be far behind NGC 1068 at varying distances. The clustering of quasars appeared to be an accident that we observe in our sky.

Burbidge, to the contrary, argues that the clustering is no coincidence. Although the quasars do indeed have high redshifts, Burbidge's calculations say the quasars were ejected from the galaxy and remain near it. The complete study will be published in the Jan. 20, 1999 edition of The Astrophysical Journal Letters (volume 511).

"If you count the number of quasars in the entire sky, you come up with about three per square degree," said Burbidge, who has studied the spectra of stars, galaxies and quasars for more than 50 years. "But if you measure the area in NGC 1068, it averages to about 70 per square degree."

Burbidge's study leaves open the question of the process that leads to the ejection of a quasar from a galaxy. And it casts doubt about the usefulness of strong redshift signals emanated by quasars.

Nearly 70 years ago Edwin Hubble showed that the redshifts in the spectra of galaxies of stars were proportional to the distances of galaxies. This result, when interpreted in terms of Einstein's general theory of relativity, led to the belief that the universe is expanding.

Shifts in spectrum lines suggest that objects are moving relative to the observer. Redshifts indicate objects are moving away from us, and the further away they are the faster they are moving.

Since light travels to Earth at a finite speed, when we see an object with a large redshift, and that redshift is due to its distance away from us, we are looking back in time, seeing the object as it was when the light was emitted. Thus many believed that the large redshifts in some quasars could be used to study cosmology and to see the universe as it was billions of years ago.

Burbidge's conclusions, while not arguing that all redshifts are not cosmological, question the value of using quasars to look at a younger universe because it now appears that all quasars are not at great distances from us.

"There is no clear understanding of this within the framework of the physics that we currently understand," said Burbidge. "Thus once again astronomical observations are telling us something new about the physics of the universe."

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