February 20, 2009

Mr. Robert Naeye
Editor, Sky and Telescope
90 Sherman Street
Cambridge, Massachusetts 02140-3264

Dear Sir:

In the February issue of Sky and Telescope (p. 16), you invite readers' comments on dark energy and cosmology. I am taking you at your word.

The only "bad" thing for astronomy or for science is a dogmatic insistence on orthodoxy. To bull-headedly insist that the earth is the center of creation or that the epicyclic Ptolemaic system represents reality would be bad for astronomy and for science. Similarly, to insist that models of the universe must be based on Einstein's General Relativity may be the current Ptolemaic dogma. What is the alternative?

Whatever it is, it must reckon with "dark matter" and a seeming acceleration of cosmological expansion. Let us begin with "dark matter". It may come as something of a surprise that the solution is suggested by the now well-known relativistic advance of the perihelion of Mercury. That effect, predicted correctly by both general relativity and special relativity (see "The Mystery of Xi Persei") is not "caused" by a "curvature of space-time" but by the fact that the sun performs work in drawing the planet closer at perihelion, thereby adding to its mass according to the mass-energy relation $E = m c^2$. The perihelion advance is easily shown (by ninth grade algebra) to be proportional to the average of the gravitational potential energies at perihelion and aphelion divided by $c^2$. The space in which the orbit of Mercury is so modified does indeed have a space-time curvature, but this is a result of Mercury's variation of mass, not a cause.

If the mass of Mercury is increased infinitesimally by work done on it by the sun, the mass of a star in Mercury's place would be increased by a correspondingly greater amount. The mass of a million stars would be increased a million times more than this. To be sure, actual stars are much farther from the sun than is Mercury, but could their number offset this disadvantage? Yes they could, and they do in great stellar assemblages such as galactic nuclei or globular clusters. Detailed rough calculations justify such an assumption. The effective gravitational mass of a globular cluster or a galactic nucleus is thus much more than the mass reckoned by simply totaling the numbers of stars in a large assemblage. The apparent excess is the so-called "dark matter". The greater kinetic energy of the greater matter is the "dark energy". Look no further.

Now to accelerated expansion. The fact is, accelerated expansion has never been observed. What has been observed is an unexplained faintness of Type Ia supernovae. This faintness has been attributed to greater distance. Greater distance has been attributed to accelerated expansion. Voila! But greater faintness might better be explained as due to the attenuation which will be experienced by any receding source of radiation. Only if the source is receding rapidly, as the very distant galaxies are, will the attenuation be observationally significant. Voila again! No acceleration.

In addition to the existence of an acceptable alternative to dark matter, dark energy and accelerated expansion, there are compelling objections to general relativity. Einstein's addition of a linear term to his cosmological field equation would require that the greater the distance between two masses, the more strongly they would repel each other. Though this repulsion dominates the Newtonian attraction only at enormous separations, it is manifestly and violently counterintuitive. Einstein was well advised to condemn his cosmological term as his "greatest blunder".

Sincerely,

Wasley S. Krogdahl
Professor Emeritus
Physics and Astronomy, University of Kentucky
3493 Castleton Hill
Lexington, Kentucky 40517
859-272-2659
W. Krogdahl @heretical cosmology.com