QSO redshifts and the steady state cosmology

JOHN GRIBBIN (Nature, 257, 540; 1975) has ably summarised the work by one of us (P. K. D.) which appeared recently (Mon. Not. R. Astr. Soc., 172, 623; 1975) on the subject of the relationship between angular diameters and redshifts in Hoyle-Fowler type models of QSOs. Gribbin's ability as a mind-reader, however, must be seriously questioned when he writes in his preamble: "... although Das does not mention the steady state theory, it seems a reasonable assumption that any colleague of Narlikar's who discusses possible non-cosmological contributions to the redshifts of QSOs has the concept not too far towards the back of his mind." While discarding a theory so 'unholy' was at the back of our minds in our recent paper, we would like to take this opportunity to point out that too much importance is being given by astronomers and science writers (New Scientist, July 3, 4; 1975) to any connection between the QSO redshifts and the non-cosmological theory of QSO redshifts.

It is true that observations indicate that strong evolutionary effects are at work if the QSO redshifts are wholly cosmological in origin. It is also true that such evolutionary effects would be against the simple steady state hypothesis. Thus a theory of non-cosmological origin of QSO redshifts is probably necessary for the survival of the steady state theory. But here the connection between the two ends. For example, even if the QSOs turn out to have an appreciable non-cosmological component in their redshifts, this does not validate the steady state theory which still faces other observational hurdles like the microwave background. Nor does the dis-proof of a particular non-cosmological redshift hypothesis in a single QSO—like the gravitational redshift (Wampler, et al., Astrophys. J., 198, L49; 1975) in the case of 3C48—particularly embarrass the steady state theory.

Indeed, regardless of any cosmological prejudices it is pertinent to ask: "Is the redshift of a QSO due to the expansion of the Universe alone?" A fair assessment of the present data does not permit an unequivocal affirmative answer to this question. Even the overall problem of the structure of a QSO still remains unsolved. Under these circumstances even theoreticians sympathetic to the steady state cosmology may work on models of non-cosmological redshifts for reasons not primarily concerned with defending that cosmology.

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Lasers and the Lamb shift

from Peter Knight

The investigation of atomic structure by conventional spectroscopic techniques (for example, excitation using electron impact in a discharge tube and resolution of the emitted radiation with interferometers) is severely limited by Doppler broadening and consequently relies heavily on a precise understanding of the lineshape of the emitted radiation. To see the subtle effects of current interest within Doppler broadened spectral lines, with widths typically of the order of GHz, the spectrosocist is forced to the limits of available technology. This is especially true of that most "fundamental" of atoms, the hydrogen atom, which, being the lightest, atom suffers most from Doppler broadening. The arrival of the tunable laser in atomic physics has, however, totally revolutionised optical spectroscopy. This long-awaited revolution is perhaps best characterised by a series of beautiful experiments on atomic hydrogen using dye laser excitation performed by T. H. Häschn and coworkers at Stanford. In a recent paper (Phys. Rev. Lett., 35, 1262–1266; 1975) Häschn, Lee and Wallenstein report measurements of the isotope shift of the 1s–2s transition in atomic hydrogen and deuterium, and the Lamb shift of the 1s ground state of...