Reber's Cosmology

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The January-February 2015 issue of the SARA journal, *Radio Astronomy*, included a reprint of a 1989 article by Grote Reber.[1] Most radio astronomers, this author included, place Mr. Reber on something of a pedestal, for he performed the first real radio astronomy—and he was an amateur to boot. His view of cosmology therefore came as a great surprise. Not so much because he was wrong, but because he was writing more like a True Believer than a scientist. His emotional insistence that observed red shifts do not indicate an expanding universe is a good cautionary tale for all scientists, amateur and professional alike.

Mr. Reber was, apparently, a staunch opponent of big bang cosmology, liking instead something called the "tired light" hypothesis to explain the red shifts observed in the spectral lines in light from distant galaxies. He did not like the idea that these red shifts were being used as evidence of cosmic expansion in support of the big bang theory. This in itself was okay – he was in good company at the time. Unfortunately, he and his good company turned out to be wrong. One can only wonder what he would have thought about the fact that the universe is not only expanding, but expanding ever faster.

The jury is still out on exactly what happened at the instant of the big bang itself, but best anyone can tell, the universe is expanding and the observed red shifts are produced by this expansion. Recent observations falsify tired light theory in three principal ways.[2]

- Distant galaxies observed in the Hubble Deep Field are not blurred, thus the Compton scattering mechanism at the heart of tired light theory cannot be at work. Scattered photons do not make clear pictures.
- Tired light theory cannot account for the observed time dilation in high red shift supernova decay times. Tired light predicts the same characteristic decay time regardless of red shift. We observe, however, that red shifted supernovae take longer to decay, and the greater the red shift, the longer the decay time.
- Tired light theory does not predict the correct spectrum of the cosmic microwave background radiation (CMBR). The CMBR spectrum predicted by tired light theory disagrees with the CMBR spectrum observed by COBE by about 100,000 standard deviations. This puts tired light in Wolfgang Pauli's "not even wrong" category.

All of which would have been no problem had Mr. Reber been a bit more careful with his emotional attachment to a pet theory. When rational scientists receive data that contradicts their views, they simply change their minds accordingly. This can be somewhat painful, however, if one has already publicly called the opposing camp a bunch of reactionary idiots like Mr. Reber did.

Mr. Reber's fondness for tired light was an opinion to which he was entitled, for he did not have the benefit of the recent observation data that falsifies the theory. There is little excuse, however, for not understanding the core concept against which one is railing. Mr. Reber complained that the observed spectral shifts could not be Doppler phenomena because

a) there are no observed blue shifts*, and
b) the spectral shifts are proportional to distance.

The problem here is that such phenomena are *exactly* what one would expect if the spectral shifts were due to cosmic expansion.

* There are in fact observed blue shifts. For example, the Andromeda galaxy exhibits a blue shift and will likely collide with our galaxy in about 4 billion years or so. Blue shifts are rare because cosmic expansion swamps the peculiar motion of the observed galaxy – unless the galaxy is nearby, where the velocity due to cosmic expansion is low.

Grote Reber was a great radio astronomer, pioneering a field where others saw nothing useful. He made a huge contribution to the field and is worthy of our respect and admiration for that. As a cosmologist, however, perhaps not so much.

There are plenty of things about which we don't know everything – dark matter, dark energy, mass… even the humble electron. All of these concepts are just names, placeholders for our ignorance about what these things are on a deeper level. Some of them may – probably all of them, eventually – turn out to be a quite different than we imagine. A good scientist leaves room for that.

References & Further Reading

[1] Reber, G., *The Big Bang is Bunk*, Radio Astronomy, Jan-Feb 2015; originally published in 21st Century Science & Technology, Mar-Apr 1989.
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