

Radio Astronomy Heading for a Dead End.

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During the past decade a large number of papers have appeared describing observations at shorter and shorter wavelengths using ever more expensive equipment to produce results of decreasing scientific importance. As the wavelength is reduced the phenomena encountered become more nearly thermal. An interesting example is Cassiopeia A. A dozen years ago (1) I performed observations demonstrating that at 3 meters wavelength a bright ring one half minute of arc thickness provided the major source of observed energy. This ring is different from the visible shreds of the old nova and represents nonthermal radio waves generated in the expanding shock front. Later, Ryle (2) using much more elegant techniques at 0.21 meters wavelength provided details of the thermal remnants of the ring which resemble the visible shreds. His technique is an immense improvement over simple interferometry (3) at the same wavelength. At 0.09 meters (4) wavelength it may be inferred by fourier analysis and considerable intuition that some kind of double structure exists in the source. At 0.02 meters wavelength (5, 6) all traces of the nonthermal energy source have disappeared. The main excuse for the existence of radio astronomy is the study of invisible natural sources of nonthermal energy (7). These become prominent at one meter wavelength and dominate the scene at ten meters wavelength. Clearly, the above progression of technology is in the wrong direction. Recent observations here demonstrate the sky is covered with new, different, interesting and important fine detail to wavelengths at least as long as 144 meters (8) as I predicted (9).

Study groups are necessary to any branch of science which involves large expenditure of time, money and manpower.

Without such groups debacles like Sugar Grove are a near certainty. Study groups must have an imaginative and courageous agenda. Lacking this, they gravitate towards scientific archeology developing technological dinosaurs. Examples are the NSF groups on the Largest Feasible Steerable Telescope (LFST) and the Very Large Array (VLA). Decades will pass before either could be realized. Both are already obsolete as they are merely extravaganzas of the above progression. The problems they purport to solve either don't exist or are of slight importance (7, 8). The efforts of these groups must be directed into more productive channels.

I suggest the techniques of Ryle be appropriated and scaled up by a factor of twenty-five to 5 meters wavelength. Due to the relatively greater intensity of the phenomena, the apertures need be only ten times as large or 200 meters diameter. Each aperture is to be a horizontal flat completely filled with 5000 dipoles. The two fixed apertures will be forty kilometers apart with a third aperture movable along twenty kilometers of multiple rail track. The technology, for making the beam follow celestial objects by entirely electronic methods is well understood and at hand. Multiple beams will improve the rate of data acquisition. An additional feature may be added to make the installation useful at 15 meters wavelength during next solar activity minimum. The angular resolution will be one minute of arc at 5 meters wavelength and three minutes at 15 meters. Such an installation will open a whole new world of invisible nonthermal astronomical phenomena which cannot be even guessed at by optical or microwave techniques. The cost will be less than the 140 ft. dish at Green Bank or the 1000 ft. hole at Arecibo, both of which are now obsolete; and trivial compared to VLA or LFST.

Even more important, hardware can be producing results in a few years, not decades.

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