FIELD OF VIEW OF RADIO INTERFEROMETERS

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We are studying the feasibility of measuring faint polarization signals in the 2.7 K Cosmic Microwave Background (CMB) radiation using a close-packed interferometer array. The use of an interferometer instead of an imaging system is motivated by the need to control systematic effects. A filled array is chosen to achieve the high sensitivity levels required for these measurements. Under the assumption that background-limited detectors are employed, the sensitivity of imaging and interferometer systems is determined by the total throughput ($A\Omega = n\lambda^2$) of the optical system. We are studying interferometers in which corrugated horn antennas view the sky directly. The field-of-view of the interferometer is determined by the beamwidth of the horn antennas and in principle can be very large (i.e greater than 7 degrees FWHM). A large field-of-view is important for making instantaneous maps of large sections of the sky without scanning. The optical throughput of the interferometer is determined then by the number of horns in the array. Of course, one must keep in mind that the diameter of the array (the longest baseline) constrains the maximum RF bandwidth of each spectral channel of the interferometer. As a demonstration, we are constructing an instrument called the Millimeter-wave Bolometric Interferometer (MBI) that will operate from the ground at 90 GHz. MBI is an adding interferomter: RF amplitudes from the horn antennas are combined in waveguide structures and the interference signals are measured using cooled bolometers as detectors. These efforts are part of a study of the Einstein Polarization Interferometer for Cosmology (EPIC), a mission concept study for NASAs Einstein Inflation Probe.

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4. I - Invited Paper, Program chair: Halverson

5. No special instructions