

## Near Quantum-Noise Limited HEB Heterodyne Detectors and Arrays for Up to 12 THz

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The most promising heterodyne detector for future space instruments in the terahertz range beyond Herschel is the HEB mixer. We have recently demonstrated a prototype 1.6 THz three element HEB array with integrated MMIC IF amplifiers, and will present plans for extending such arrays to the higher terahertz frequencies. Such development requires a new approach for fabrication and array architecture. We will also discuss new technological solutions for the problems of antenna coupling, LO injection and MMIC integration which must be solved for the next generation of detectors/arrays. We have presented the first theoretical analysis of quantum noise in HEB mixers, and will show results which indicate that these detectors should yield system noise temperatures up to 12 THz of ten times  $hf/k$  and most likely better than this. Measurements are in progress to verify this.