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Progress and Perspectives of THz Astronomical Detectors[1]

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During the past decade, THz astronomical observations from ground based, suborbital and space platforms have become a reality. The most impressive progress has been made in heterodyne spectroscopy instrumentation due to a tremendous effort in the development of solid state local oscillators and SIS and HEB superconducting mixers. Whereas the current SIS technology may have almost reached its limit, the HEB mixers expanding far into the THz frequencies have yet a large room for improvement. The progress in direct detectors has been mostly due to the development of photoconductive detectors for wavelengths shorter than 50 μm and of composite bolometers for longer wavelengths. Both technologies have pretty much reached their limitations for improvement. Future THz astronomical space missions will require both non-parallel sensitivity and large-scale arrays of both direct and heterodyne detectors. I will discuss how these objectives can be met with recently emerged types of superconducting and semiconductor sensors utilizing new physical detection mechanisms.

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