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Room temperature high efficiency heterodyne THz QW detector based on quantum coherence HAMID JAVADI, KISHOR KAPALE, JPL — THz devices are used for Earth's (and other planets) atmospheric remote sensing, astronomical investigation of interstellar dust medium, and life detection instruments for in-situ probing of the planet's surfaces. As the radio astronomy science community demands observations at higher THz frequencies, there is a technology development push for high power tunable THz sources, high efficiency room temperature heterodyne detectors that need low power local oscillators, and high dynamic range near-quantum-noise-limit detectors. THz technology gap is being filled up by traditional optics and microwave communities. Quantum coherence promises to be the enabling technology in many technical areas [including Electromagnetically Induced Transparency (EIT) based magnetometer, all optical switch, single photon counter, quantum computer, micro-K laser cooling). Quantum coherence phenomena have been demonstrated successfully in select (gaseous) atoms, and in few (crystalline) solids. We will discuss a heterodyne THz QW detector device based on quantum coherence with prospects of performing near-quantum-noise-limit at room temperature with high quantum efficiency, where the need for high power THz source is eased, and phase-matching is no longer restrictive. THz down-conversion concept via closed-loop four-wave-mixing will be discussed.

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