# Rydberg-atom sensing of a terahertz frequency comb

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Rydberg-atom sensors span a broad range of frequencies from radio to terahertz. With proper laser technology and adressing, Rydberg atoms can sense many disparate frequencies at the same time. The sensitivity can also be exceptional when using the sensor as a transducer [1], as the noise floor is only limited by very small fluorescence noise. Here we present new results on sensing of THz photons generated from a femtosecond laser impinging onto a photoconductive antennta, thus creating a terahertz frequency combs. Such combs present many unique applications especially in spectroscopy. Here we are able to distinguish single teeth of the comb with excellent SNR, a feat that is not possible with any other conventional THz detectors. Our systems allows for tuning between adjacent teeth and characterization of their coherence properties. Combined with a comb reference, the sensors can serve as a calibrated radiometer spanning the spectum of interest to Earth obeservations and radioastronomy

[1] S. Borówka et al., Continuous wideband microwave-to-optical converter based on room-temperature Rydberg atoms, Nature Photonics **18**, 32-38 (2024).