

# A Study on Photon Counting Interferometry in Terahertz Frequencies

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**Abstract**—A new interferometer technology is proposed that is based on intensity interferometry. In terahertz frequencies photon statistics is not random but there is some coherence in intensity, or photon bunching, is expected when brightness temperatures of thermal sources are higher than about 100 K. Although standard intensity interferometer cannot measure phase information, when photon counting detectors are introduced, it will be possible to measure delay time of bunched photon arrival and complex visibility can be measured.

Some case study is made to estimate feasibility of the photon counting interferometry; one for far-infrared fine structure line observations from Antarctic plateau and another for observing exo-planets in far-infrared wavelengths from space platforms. In both cases, it is estimated that we can measure photon arrivals and complex visibilities can be used to make aperture synthesis images of the sources.