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EXPLORING OPTICAL SETI'S MIDDLE GROUND

Abstract

Optical Search for Extra-Terrestrial Intelligence (SETI) experiments have concentrated largely on detecting either pulsed lasers that briefly outshine background starlight or continuous lasers that are distinguished from background by intense or unique spectral features. But there is a middle ground possible where the temporal variation of a potential optical SETI source could help distinguish it from its stellar background, even if it never outshines this background. We present initial results from such a frequency-domain search, covering a range of 1 to 10,000Hz, with an instrument that simultaneously searches two broad spectral bands. It is shown that under appropriate conditions it is possible to detect a tone signal that is 1000 times less intense than the background starlight, even with a relatively small telescope. If one assumes that the extraterrestrial's signal is monochromatic, spectral filtering could substantially improve this ratio. After summarizing the instrument design and the associated analysis tools, quantitative analyses and star test results are presented from observations with a 30" telescope. The variations in detectability due to star magnitude, tone frequency and signal amplitude are discussed, including the effects of atmospheric seeing. Finally, brief summary observations are given for popular optical SETI targets such as KIC 8462852 and HD164595, and of a few "detections" that are either explained or currently unexplained.