

42nd SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) – The
Next Steps (A4)
SETI 1: SETI Science and Technology (1)

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HARVARD ADVANCED ALL-SKY OPTICAL SETI - INITIAL OBSERVATIONS WITH THE
ADVANCED CAMERA

Abstract

The Harvard/Planetary Society's all-sky search for pulsed optical signals from other civilizations has received a second-generation camera upgrade and we report initial observations with sensitivity approaching the near-infrared. Using a 1.8m, spherical f/2.5 optical telescope, our transit survey needs ~ 150 clear nights to observe each point in the Northern sky from Harvard, MA between -20° to $+70^\circ$ declination for a minimum of one minute. Optical pulses in the night sky are detected by an array of 512 photomultiplier tube pixel pairs whose outputs are sampled and then digitally recorded by fast electronics in the all-sky camera. A five-year design effort, undertaken to improve data quality and background noise rejection, resulted in a reconfigured optical pulse camera. The new Advanced All-sky Camera introduces a flexible, FPGA-based, electronics back-end that can sample photomultiplier tube outputs 2.5x faster (1.5 Gsps), record 10x longer ($10 \mu\text{s}$), and read from 64x more pixels concurrently than the previous-generation, ASIC-based camera. There is less extinction for pulses at longer optical wavelengths in the interstellar medium so, in order to increase the expected search range, the Advanced Camera upgraded to Hamamatsu 7546B-20 photomultiplier tubes that have extended red sensitivity ($>1\%$ from 300nm to 880nm). This talk will describe the all-sky survey, discuss the Advanced Camera and its enhanced capabilities, present recent observations, and refine the limits the survey has placed on the density of pulsed optical transmitters in our galaxy.