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SETI I - Technical Aspects (1.)

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CHALLENGES IN THE FIRST ALL-SKY OPTICAL SETI

Abstract

The Harvard/Planetary Society all-sky optical SETI marked a significant increase in search capability and instrument complexity. It is the first all-sky optical search, the first optical search with multiple sky pixels (there are 512 in the all-sky search, compared with one in all targeted searches), and the first use of a full-custom chip designed exclusively for optical SETI. The arrays of photomultiplier tubes, printed circuit boards, microcontrollers, programmable logic, and custom chips in the all-sky instrument are capable of a computational throughput (a data rate of 3.5 Tb/s) that is comparable to current, sophisticated radio searches. This talk will focus on technical solutions to the challenges of building an all-sky optical search instrument. Topics covered will include: instrument design choices (electrical, optical, and mechanical); experiences in full-custom chip design; software for real-time diagnostics and instrument control for remote and/or automated observations; and design for reliability of arrayed electronics.