

THE PLANETARY SOCIETY'S OPTICAL SETI TELESCOPE FACT SHEET

The new Optical SETI telescope is a 1.8-meter (72-inch) reflector. Reflector telescopes use a mirror to capture the light, whereas refractors use a lens. Built around a circular mirror with a diameter of 1.8 meters, the new telescope is the largest optical telescope east of the Mississippi!

The telescope's mirror has a spherical, rather than parabolic curvature. The mirrors of most telescopes have parabolic curvature, because spherical curvature makes the images near the edge of the field of view a bit fuzzy. Since the optical SETI telescope will not be used to take beautiful pictures but instead will detect brief flashes of light, this does not matter. Horowitz and his team therefore opted for the simpler (and cheaper!) spherical design.

The mirror's curvature is f/2.5. This means that the ratio of the mirror's focal length (4.4 meters) to its diameter (1.8 meters) is 2.5.

In order to process the data from the telescope, graduate student Andrew Howard had to develop a brand new electronic chip from scratch. Commercially available chips lacked the combination of characteristics necessary for all-sky optical SETI. The requirements included fast and accurate digitization, real-time data processing, fast signal switching, and data-parallelism to accommodate all signals produced by the camera's 1024 pixels. With no prior chip-design experience, Andrew successfully designed a chip called "PulseNet" that meets all the demands of the Optical SETI telescope. Thirty-two PulseNets form the computing core of the telescope's camera.

Each Pulsenet chip contains a quarter of a million transistors!

The telescope's custom-made camera weighs about 200 pounds. The camera contains 16 pixelated photomultiplier tubes (PMTs), 32 PulseNet chips, 12 microcontrollers, 12 programmable-logic chips, 1 motherboard, and 8 daughterboards!

PMT photodetectors are extremely fast. The more common CCDs (charge-coupled devices) used in most cameras are simply not fast enough to detect the brief flashes of light the Optical SETI telescope will be looking for.

The surface of each PMT is divided into 64 pixels. This makes for a total of 1024 pixels in the camera, each functioning as an independent photodetector. When the telescope is operating, the camera will process 3.5 terabytes of data every second! To give an idea of what this means, it is roughly comparable to scanning the contents of all the books in print, every single second.

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