SETI Programs at the University of California, Berkeley

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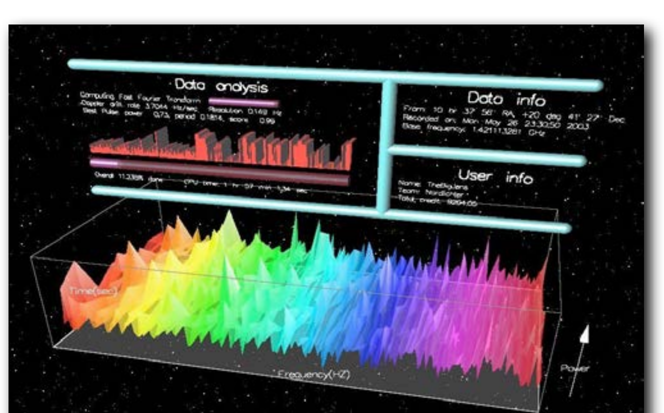
SETI@home

Launched in 1999, SETI@home has engaged over 8 million people in 226 countries in the search for life on other worlds. Currently, participants in the project are generating a collective equivalent of 680 TeraFLOP/sec. SETI@home II users have performed over 2.5 x 10^{22} FLOPs to-date. This immense and growing computing power is being used to conduct a commensal sky survey for narrow-band signals utilizing Arecibo's ALFA multi-beam receiver.

NAIC Arecibo Observatory

SETI@HOME Specs

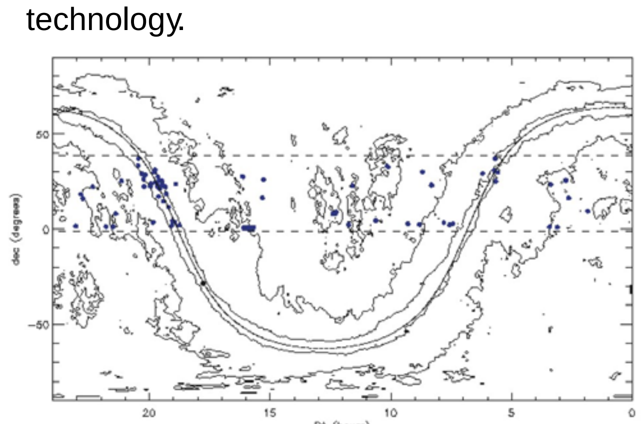
Bandwidth:	17.5 MHz
Spectral Resolution:	0.037-1221 Hz
Channels:	7 x 10^8
Sky Coverage:	25%
Sensitivity:	1.4 x 10^{-26} W/m^2



SETI@Home Screenshot

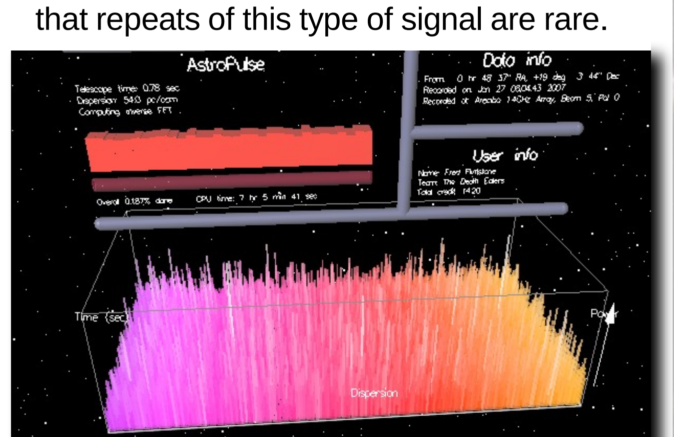
AstroPulse

AstroPulse is a companion project to SETI@Home. Rather than looking for a large amount of energy in a narrow frequency range, AstroPulse looks for a large amount of energy in a narrow time slice - a radio pulse. These radio pulses could come from dead stars, massive objects colliding with one another or perhaps a beacon from a very advanced technology.



The plot above shows several radio pulses that have been detected by AstroPulse volunteers. Many of the pulses are clustered within the plane of our own galaxy, which is a good indication that the source of these pulses is not terrestrial.

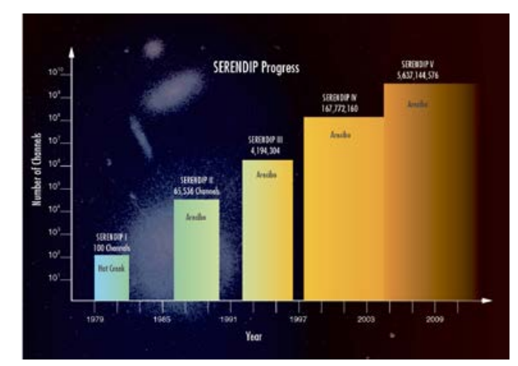
The dashed lines indicate the part of the sky viewable from the Arecibo Observatory. Follow up observations found no repetition of signals indicating that repeats of this type of signal are rare.



AstroPulse Screenshot

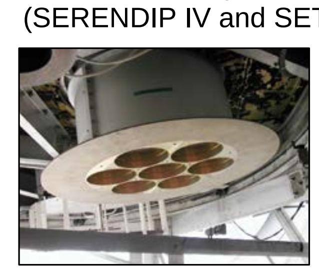
SERENDIP

SERENDIP is an acronym that stands for the **S**earch for **E**xtraterrestrial **R**adio **E**mission from **N**earby **D**eveloped **I**ntelligent **P**opulations.



SERENDIP Progress: Past, Present and Future

The SERENDIP VI sky survey is deployed at both Arecibo and the Green Bank Observatory. At Arecibo it observes with the 7- beam Arecibo L-band Feed Array (ALFA) and in conjuction with the 327MHz Sky Survey. The Green Bank SERENDIP VI system is receiver agnostic. Each SERENDIP VI system is capable of observing 2.5GHz of simultaneous bandwidth in dual polarizations which can be from single receiver, or divided among the multiple receivers for array feeds like ALFA. The observations are 10 times more sensitive and 100 times more comprehensive than the most sensitive existing SETI large-area surveys (SERENDIP IV and SETI@home).



ALFA Multi-Beam Receiver

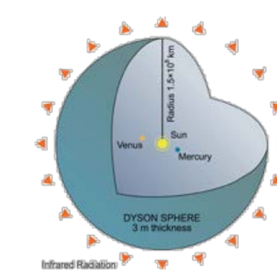
Serendip VI Specs

Bandwidth:	2500 MHz
Spectral Resolution:	1.0 Hz
Channels:	2.5 x 10^9
Sky Coverage:	25%
Sensitivity:	1 x 10^{-25} W/m^2

IR Excess

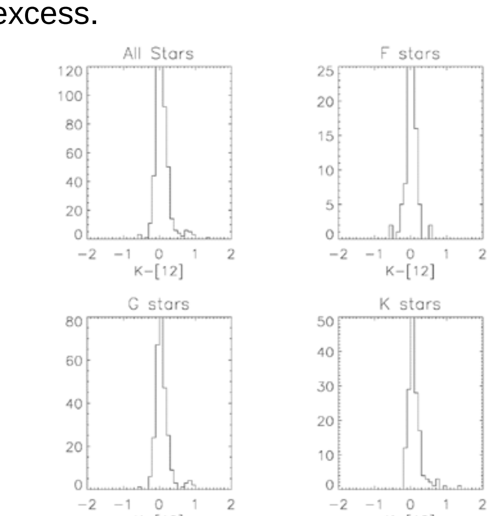
The UC Berkeley Infrared Excess Search attempts to identify excess thermal infrared radiation emitted from highly advanced civilizations by searching the IRAS and 2MASS catalogs and performing follow-up observations on likely candidates with the SETI@home, Serendip V, and Optical SETI databases.

The initial dataset consists of 1000 stars with ages determined by Ca II absorption to be >1 gigayear to reduce the likelihood of an associated protoplanetary disk.



Cut-away Diagram of an Idealized Dyson Surface

Infrared excess was determined via the K-[12] indicator. The K band is thought to be quite insensitive to stellar atmosphere fluctuations, and hence provides a stable benchmark for color excess.



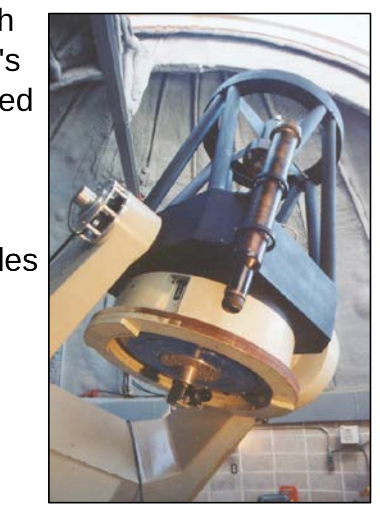
Infrared excess for all 540 target stars (upper left) and based on stellar type.

33 IR excess candidates were found and subsequently searched for anomalous radio emission nanosecond-scale optical pulses. No convincing signals were found.

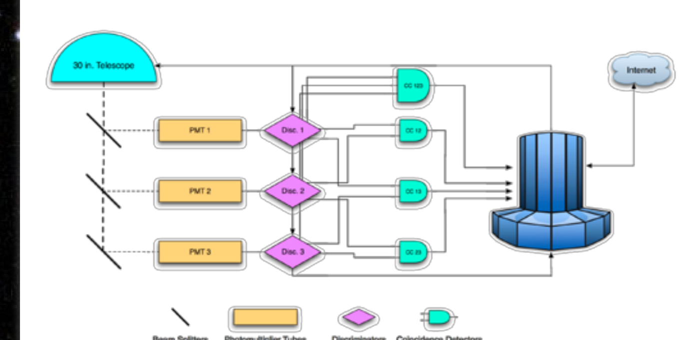
Optical SETI

The Optical SETI program at UC Berkeley searches for nanosecond time scale pulses, perhaps transmitted by a powerful pulsed laser operated by a distant civilization. Began in 1997, this program was the first search of its kind.

The pulse search utilizes Berkeley's 30 inch automated telescope at Leuschner Observatory in Lafayette (15 miles east of campus) using a custom built photometer designed specifically for optical SETI.



Leuschner 30 in. Telescope



Schematic Diagram of SETI Photometer

Optical SETI Specs

Band:	300-650 nm
Average Flux Limit:	1.5 x 10^{-28} W/m^2
Peak Flux Limit:	1.5 x 10^{-17} W/m^2
Stars Surveyed:	11,000 nearby FGK
Galaxies Surveyed:	104

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