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NAYUTA OSETI: OPTICAL SETI WITH THE LARGEST TELESCOPE IN JAPAN

Abstract

Optical SETI (OSETI) project was suggested by Schwartz and Townes (1961). Some OSETI observations have been performed. Reines and Marcy (2002) searched for laser emission in the Keck spectra. They estimated the detection limit of power of laser. We also calculated the detection limit of power for the case of a spectrograph system of 2m NAYUATA based on the logic of Reines and Marcy (2002) and obtained the result, 10+16 W. The one of the most powerful laser on the Earth is the LFEX laser at Institute of Laser Engineering Osaka University which was completed in 2008. This can produce 10+16 W laser. We carried out Japanese first Optical SETI (OSETI) observations with the NAYUTA (the largest optical telescope in Japan) at Nishi-Harima Astronomical Observatory from November 2005 to October 2009 based on the method of Reines and Marcy (2002). The Second Harmonic Generation (SHG) of YAG lasers were searched in wavelength width (450 Å) of the spectrograph. 5320.7 Å (SHG R2 Y3) was decided for central wavelength to observations.

13 stars (e.g. 55 Cnc, Gl 581, HD 69830) whose planets may remain in the Habitable Zone were selected for our targets. The reduction of spectral data was performed using the IRAF software package in a standard manner. The signal, if any, will appear as a variation of intensity at laser wavelength. We searched such variation by subtracting a spectrum as one time from another. No candidate signal above 6 sigma level was found in our data.

In 13 of total 56 nights, visitors from the general public were invited to observations under the “NHAO at-site program”. If we had detected a candidate signal, then we would have observed the “post-detection SETI protocol of International Academy of Astronautics (IAA)”. Therefore visitors must sign the pledge card before observations. We would also like to mention problems of the IAA protocol.

References

- Reines, A. E. and Marcy, G. E. 2002 PASP 114, 416
Schwartz, R. M. and Townes, C. H. 1961 Nature 190, 205