

Optical SETI observations with the NAYUTA telescope II

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(Received 2011 November 1)

Abstract

Additional Optical SETI (OSETI) observations were conducted on 22 nights from 2007 October to 2009 November with the 2m NAYUTA telescope at Nishi-Harima Astronomical Observatory (NHAO). We have searched for SHG (Second Harmonic Generation) of YAG laser emission lines in the optical spectra of 8 stars with a spectrum comparison method used in our previous study. The candidate emission lines were not observed in the spectra.

Key words: SETI – OSETI – Spectroscopy – Exoplanetary system – Goldilocks Zone – Habitable Zone – : Individual(55 Cnc, 51 Peg, 70 Vir, GJ 526, GJ 581, GJ 880, HD 69830, HIP 107395)

Optical SETI (OSETI) project was suggested by Schwartz and Townes (1961). Some OSETI studies have been performed (e.g. Beskin et al. 1997, Reines and Marcy 2002, Howard et al. 2004, Bhathal 2011). Narusawa & Morimoto (2007) carried out Japanese first OSETI observations on 34 nights from 2005 November to 2007 August using the MALLS (Medium And Low-dispersion Longslit Spectrograph) of the 2m NAYUTA telescope at Nishi-Harima Astronomical Observatory (NHAO) based on the method of Reines and Marcy (2002). They searched for SHG (Second Harmonic Generation) of YAG lasers in the MALLS data (central wavelength: 5320.7 nm, wavelength range: 450 nm).

We conducted additional OSETI observations on 22 nights from 2007 October to 2009 November with the same setting as Narusawa & Morimoto (2007). Two previous (55 CnC and 51 Peg) and five new target stars (70 Vir, GJ 526, GJ 880, HD 69830 and HIP 107395) were searched. Jones et al. (2005, 2006) have examined whether putative Earth-mass planets could remain confined to the Goldilocks (Habitable) Zone of the exoplanetar systems including 51 Peg and 70 Vir. They found that an Earth-mass planet could be confined to the HZ (outside the orbit of hot jupiter) for at least 1000 Myr stably in 51 Peg and 70 Vir systems. At least one planet (GJ 581 d, 7 Earth Mass) exists in the located in the Goldilocks Zone (e.g., von Paris et al. 2010, Wordsworth et al. 2011, Hu and Ding 2011). One of five planets of 55 Cnc (55 Cnc f, 0.155 Jupiter Mass) is located in the Goldilocks Zone (Fischer et al. 2008, von Braun et al. 2011). HD 69830 has three planets and HD 69830 d (1 Neptune Mass), which is the outmost planet in the system, is located in the Goldilocks Zone (Lovis et al. 2006, Rugheimer and Haghighipour 2007). Up to the time of this report, no planets have been discovered in the stars of GJ 526, GJ 880 and HIP 107395. However these three stars are listed in the HabCat (The Catalogue of Nearby Habitable Systems; Turnbull and Tarter 2003).

The observational journal is summarized in Table 1. In 2 of total 22 nights, visitors from the general public were invited to observations under the “ NHAO at-site program (Sakamoto 2008) ”. The method of data reduction was described in Narusawa & Morimoto (2007). No candidate signal above 6σ level was found in our data.

We would like to acknowledge the staff of NHAO for their assistance in the observations. We also grateful to the late M. Morimoto and H. Naito for discussions.

Table 1. Observational log.

Obs. date	Star	Remarks
2007/10/05	51 Peg	
2007/11/02	51 Peg	1
2007/11/03	51 Peg	
2008/02/10	55 Cnc	
2008/02/22	55 Cnc	1
2008/03/11	70 Vir	2
2008/03/12	70 Vir	2
2008/03/14	70 Vir	2
2008/05/31	GJ 581	
2008/07/08	GJ 880	
2008/10/01	GJ 880	
2008/10/16	GJ 880, 55 Cnc	
2008/11/04	GJ 880, 55 Cnc	
2008/12/15	GJ 880, HD 69830, HIP 107395	
2009/03/24	55 Cnc	
2009/03/28	55 Cnc	3
2009/04/28	GJ 526	
2009/05/01	55 Cnc	4
2009/05/08	GJ 526	
2009/05/09	GJ 526	
2009/11/26	HIP 107395	4
2009/11/27	HIP 107395	4

1: visitors from the general public were invited to observations under the “ NHAO at-site program (Sakamoto 2008) ”

2: cooperative observations with the Kyushu Tokai University (Otsubo 2008)

3: a rehearsal observation of Project SAZANKA (Narusawa et al. 2011)

4: cooperative observations with the Tokai University (Suzuki 2010)

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