SETI IN OPTICAL RANGE WITH THE 6M TELESCOPE (MANIA)

V. F. Schwartsman

Special Astrophysical Observatory
Stavropolskij Kraj, Niznij Arkhyz 357147, USSR

There exist two strategies of detecting possible artifical laser signals on the radiation background of the star, suspicious to haye populated planets. The first one consists in spectroscopic detection of sharp emission lines with an unusual frequency (Schwartz R.N., Townes C.H. Nature, 190, 205, 1961). The second one is the analysis of photons coming from the object under investigation (Schwartsman V.F., Soobshchenija SAO, 19, 5, 1977). Deviations of the statistics from the poissonian characterise the magnitude variations of the object (short flares) as well as the existence of supernarrow emission features in its spectrum. The both means of signal coding seem to be possible for the connection between cosmic civilizations.

Study of the photocounts statistics of peculiar objects has been started in Special Astrophysical Observatory in 1972 with the Zeiss-600 telescope (D=60 cm). Since 1978 the observations are carried out with the 6 m telescope BTA. For the investigations of the photon statistics my colleague and I worked out and constructed an engineering and software complex MANIA (Multichanal Analysis of Nanosecond Intensity Alterations).

At present the complex MANIA allows to detect light variations of celestial objects in the range $\tau = 3 \cdot 10^{-7} - 100$ s and, correspondingly, narrow emission lines with the width $\Delta\nu \simeq 1/\tau \simeq 10^{-2} \div 3 \times 10^{6}$ Hz. Thereby, alterations of the laser line frequency within the analysed spectral range (e.g. for the additional coding of the information) doesn't decrease the possibility of the signal detection; it is only important, that the signal-to-noise ratio be not too small.

The major aim of the MANIA experiment consists in the search for black holes, the investigations of the properties of relativistic objects and flare stars. However, we also observed the objects, which are interesting for the SETI

G. Marx (ed.), Bioastronomy – The Next Steps, 389–390.

problem. Between them: the objects, with the purely continuous optical spectra and considerable proper motions (17 objects), the radiosources with the continuous optical spectra (20 objects) and nearby (10-30 pc) solar-like stars (8 objects).

The preliminary analysis of the observational results didn't show any obvious artificial signal. The data (10^{10} bit) are stored on a magnetic tape. Their treatement with the new, more effective methods of signal detection is planned.

The results of observations of 8 solarlike stars, carried out in April 1986, allow to obtain an upper limit to the power of a hypothetical arificial laser, beaming to the Earth: $P < 10^{9}$ W.

Note that the total power of lasers, which are planned to be put onto the circumterrestrial orbit in the framework of the SDI-program is of order 10^{10} W (Bethe H.A. et al., Sci. Amer., 251, 4, 1984).

These are the thesis of the talk presented by died prematurely Dr. V.F. Schwartsman to the IAU Colloquium 99. The full text of the talk is, unfortunately, not available to the editor.