equipment is of about 1 Chat. The entire complex should be thermally insulated, and the optics should be protected from the influence of gaseous environment (mainly, from oxygen atoms and ions).

The most interesting active regions of the Sun, where instabilities could occur, as well as the non-active regions with the areas of high energy releases (bright knots), protuberances and filaments will be the objects of observations by the SOT. The SOT objects will be chosen from ground-based observations.

Successful performance of the SOT experiment will permit magnetic field and solar plasma observations in various formations of the Sun with the spatial resolution as high as 0.2″. Among others, the obtained data could detail the following:

— small-scale magnetic field and plasma activity;
— connection between the origin and evolution of non-stationary processes as powerful as for example, solar flares, and the magnetic field destabilization;
— problem of electric current generation in the outer solar atmosphere;
— role of small-scale magnetic activity and plasma instability in heating the plasma;
— acceleration of particles up to high energy, and energy transfer in magnetic structures.

«SOYA-M» Experiment

## SOLAR BRIGHTNESS OSCILLATIONS MEASUREMENTS

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Most of our knowledge about the Sun has been derived from observations of visible solar surface layers: the photosphere, chromosphere and corona. One of the main problems of the modern solar physics is to develop the techniques for studying physical conditions in the solar interior and conduct continuous observations. Helioseismological research is one of the powerful means for studying the internal structure of the Sun by observations of its proper global oscillations. In many respects it has analogy to the seismological research of the Earth's internal structure.

Study of the internal structure of our nearest star, the Sun, is the goal of the SOYA-M experiment.

To meet the requirements of precise measurement of the proper frequencies of oscillations of a solar surface, it is necessary to provide a higher signal/noise ratio as well as continuity and long duration of observations. The experiment is intended for long-term measurements of the solar radiation flux with the subsequent calculation of the proper frequencies of its oscillations. The relative amplitudes of these oscillations are equal to $(1 - 10) \cdot 10^{-5}$. Stringent metrological requirements for stability of parameters of the radiation sensor and for the time interval precision are imposed to detect such a weak signal. Due to the atmospheric disturbances, measurement of such small brightness oscillations is possible only from a space station.

SOYA-M is the modified SOYA unit that was installed in «MARS-96» spacecraft, but this experiment was not realized by the reason of unsuccessful launch. It is a precise photometer measuring the solar radiation flux in a narrow spectral interval. Accuracy of discrete reading is up to $10^{-6}$ of the whole scale. Thermostabilization of measurement of circuits is used to decrease the drift of the photometer parameters because of the change of its temperature. Phase and amplitude of solar brightness oscillations strongly depend on the wavelength used. Choosing the wavelength for observations, the authors proceeded from their previous experience with a similar IRIR unit installed onboard the «FOBOS» satellite. Data processing revealed a strong degradation of filters in blue and green spectral regions and its absence in the red one. Thus, the interferential filter at $\lambda = 800$ nm will be applied in SOYA-M.

The ISS orientation system will introduce an additional error (modulation) in the measurements with the value of up to $(2 - 4) \cdot 10^{-3}$ of the whole scale (i. e., it exceeds the amplitude of oscillations

studied by one or two orders). To correct this error during posterior processing of the data, SOYA-M will be equipped with a detector for measuring two coordinates of the Sun in the field of view of the polarimeter with the accuracy of about 0.01 arcdegree. The signal accumulation time is equal to 0.5 min. The duration of the experiment is from eight months up to the total operational life of the unit (≈ 3 years). The unit is fully automated.

The program is intended for providing data from the ISS and simultaneous observations in the Crimean Astrophysical Observatory. Continuous onboard measurements, which are free of atmospheric disturbances, will permit determination of the solar oscillation spectra with high accuracy. The ground-based observations may allow establishing a correlation between the phenomena observed on the solar surface and the processes in the solar interior.

Data obtained will be in some way a continuation of the research conducted onboard the «FOBOS». They will provide a database for further studying the structure, chemical composition, and distribution of physical parameters of the solar interior.

Conducting the SOYA-M experiment will complement the FOBOS and SOHO data. Taken together, they will provide observations of the 11-years solar activity cycle.