The OGLE project is a large-scale photometric sky survey focused on studying the variability of various celestial objects. It ranks among the largest sky surveys worldwide. For over three decades, it has continuously provided groundbreaking scientific discoveries at the highest global level, pioneering new directions in modern astronomy and developing an innovative approach to astronomical observations – large-scale sky surveys and time-domain astrophysics.

One of the most significant achievements of the OGLE project includes the detection of the first gravitational microlensing events and the development of this innovative field of astrophysical research. Further groundbreaking discoveries have been made in the search for exoplanets. For the first time, two novel planet-searching techniques – transit method and gravitational microlensing – were successfully implemented. OGLE has also compiled the world's largest collection of variable stars, totaling over a million objects.

The objective of the proposed research project is to initiate and implement the next, fifth phase of the OGLE project – OGLE-V. This phase will consist of several components, involving highly ambitious scientific goals.

One of these goals will be utilizing the extensive collection of unique sky images gathered in the previous phase – OGLE-IV – and during subsequent observational seasons of OGLE-V for entirely new scientific applications, namely precise astrometry of stellar fields observed within the OGLE project. This will result in the creation of a unique OGLE/Uranus database containing precise astrometry of hundreds of millions of stars from the Galactic Center and two neighboring galaxies – the Large and Small Magellanic Clouds. These data will complement and significantly expand the astrometric data collected by the Gaia satellite, forming the basis for numerous scientific projects and analyses.

Other scientific components of OGLE-V will include innovative sky surveys aimed at acquiring data to address pressing problems in modern astrophysics. These surveys will search for gravitational microlensing events caused by dark, non-luminous stellar remnants such as black holes, neutron stars, or white dwarfs. Combined with additional astrometric and interferometric observations, it will be possible to directly measure the masses of these objects. Once a sufficient number of such events is gathered, it will enable, for the first time, empirical insights into the population of these objects in the Milky Way.

Intensive research on exoplanets will also be conducted. The primary aim will be to measure their masses using the gravitational microlensing method and analyze the occurrence rates of low-mass planets in classical planetary systems in the Galaxy, as well as recently discovered free-floating planets – planetary objects not bound to stars. Microlensing surveys targeting exoplanet studies will be carried out in collaboration with satellite missions, allowing for more detailed characterization of exoplanets in many cases.

As part of OGLE-V, neighboring galaxies – the Magellanic Clouds – will be observed. Unlike the previous phases of the OGLE project, this survey will be conducted with very high temporal resolution. This scarcely explored domain promises numerous fascinating discoveries. New observations will enable the detection of rapidly varying objects in the Magellanic Clouds and the extension of variability studies over short timescales for thousands of variable objects discovered by the OGLE project in previous phases. This survey will complete the overall picture of stellar variability in the Magellanic Clouds on timescales ranging from minutes to decades, and the newly discovered variable objects will enrich the impressive collection of variable stars in the OGLE project.