Description for the general public

Stars in the Universe like companionship and most often appear in at least binary systems, recently it turns out that we find them more often in multiple, so-called hierarchical, systems. In the late stages of their common evolution, such binary systems become very close – to the extent that both stars can even exchange matter. These types of binary systems are called cataclysmic because they show an enhanced activity and various outbursts.

The aim of this project is to examine symbiotic systems, that is, such close binary systems in which the white dwarf accretes matter from the red giant. Symbiotic stars are very interesting because they provide us with information not only about the geometry and operation of binary systems, but also allow us to determine the exact parameters of the stars forming such a system, in particular their masses and radii. Thanks to this, we can better understand the late stages of stellar evolution, which is necessary for creating theoretical stellar models.

Symbiotic stars can be studied observationally in many ways. Photometry, spectroscopy, or polarimetry are undoubtedly powerful sources of our knowledge, but they meet certain limitations when trying to determine the exact sizes of the components of such binary systems. While in the case of measurements of the *masses* of components of symbiotic stars the situation is a bit better, in the case of their *radii* the classic methods of observation are not enough, because they can be used only for eclipsing systems. Unfortunately, they are very rare.

Therefore, the natural next step in the study of symbiotic stars is to turn towards one of the most modern techniques of observation, i.e. optical interferometry. It is a method that combines the light observed by several telescopes (optical and infrared) that simultaneously observe the same astronomical object. This allows to determine the sizes and even the exact shapes of the astronomical objects. In addition, optical interferometry operates at great accuracy, on angular resolutions of the order of thousandth of the arc second, unprecedented anywhere else! As part of the proposed research, we will use this innovative observation method to study as many symbiotic stars as possible. Our observations and analysis will allow us not only to determine the size of the stars, but since we reach the innermost parts of these binary systems, we will be able to directly observe the distortion of the surface of the red giant due to the tidal forces. In addition, we will be able to directly illustrate the flow of matter from the red giant to the accompanying white dwarf, which is extremely important for the theory of binary systems.