

Brief information about the project

Name of the project	AP14972742 «Research of the nature of the Be phenomenon»
Relevance	<p>The study of the processes of matter exchange in binary star systems is an important part of cognition of the evolution of stars, galaxies, and the Universe as a whole. Stars are surrounded by near-stellar matter at all stages of evolution. These shells change the observed characteristics of stars, making it difficult to study the latter.</p> <p>The Be phenomenon is defined by observations as the presence of emission lines in the spectra of rapidly rotating B-type stars. Stars with this phenomenon exhibit continuous excess radiation (due to transitions between free and bound in the circumstellar gas), changes in brightness and spectral lines, as well as periods of complete loss of the radiation spectrum. They have disc-shaped shells without dust and are believed to be at the stage of evolution of the main sequence. The binary system was proposed almost 40 years ago as an explanation for some of the observed properties of Be stars, such as rapid rotation and the presence of circumstellar disks. Although initially this hypothesis was not well received due to the lack of supporting data, with the advent of high-resolution spectroscopy, this hypothesis has gained solid foundations. Over the past two decades, many bright Be stars have been recognized as the main components of binary systems.</p>
Purpose	The aim of the project is to study binarity in objects with Be and B[e] phenomena by spectral observation methods, which allows us to calculate the characteristics of radiation coming out of an object consisting of a star system (one or two stars) and a circumstellar shell as a mechanism for the formation of circumstellar shells.
Objectives	<ol style="list-style-type: none">1. Identification of a sample of objects for further observations - part is determined before the start of the project with the addition of new objects as the available data are collected and analyzed.2. Conducting spectral observations and reduction them in the IRAF software package.3. Collection and systematization of the available data stored in the open database of the Paris Observatory (BeSS, the spectra were mainly obtained in the Hα line with long-slit spectrographs and Echelle spectra) and about 1500 frames of Echelle spectra of 30 Be stars obtained by Anatoly Miroshnichenko (postdoctoral' scientific supervisor) and other colleagues at Three College Observatory.4. Performing calculations using a program developed by Anatoly Miroshnichenko (postdoctoral' scientific supervisor) for various observable parameters and elements of orbits.5. Analysis of the obtained observational data.

Expected and achieved results	<p>As a result of the research work, the expected outcomes of the project will be:</p> <ol style="list-style-type: none"> 1) conclusion about how common duality is among this class of objects with Be phenomena. 2) methods of finding duality have been tested (in particular, on spectral lines that have not yet been used to search for duality, for example, the Hβ line). 3) a strategy for further investigation of double Be stars is proposed. 4) the observational data collected for the project will be used to solve the problem of the appearance and disappearance of the circumstellar disks of Be stars, which to date has no unambiguous explanation. <p>- at least 2 (two) articles in journals from the first three quartiles by impact factor in the Web of Science database or with a CiteScore percentile in the Scopus database of at least 50.</p>
Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles	<ol style="list-style-type: none"> 1. Amantayeva A.E. – Supervisor. ORCID: 0000-0001-6964-8444; Scopus Author ID: 57320848800.
List of publications with links to them	-
Patents	-