One of the main tasks of planetary science is to explain the formation and evolution of the Solar System and planets (especially those of terrestrial type). The perfect way to study those problems is to study asteroids. Their mineral composition and distribution in the Solar System is one of the main determinants of the composition of the Solar nebula, the location of the line (the distance beyond which the temperature is so low that water and other violates can only remain in solid state) or the formation location of the terrestrial gas giants planets.

Asteroids are small rocky objects in the solar system. Most of them orbit the Sun in orbits between Mars and Jupiter, but asteroids can also be observed in many other places in the Solar System. For example, objects approaching Earth are often of media interest due to the potential danger of colliding with Earth.

Asteroids reflect sunlight, which makes it possible to study their spectra and determine their mineralogical composition. So far, spectra have been determined for only a few thousand asteroids (out of over a million known objects). This is to be changed by the Gaia mission of the European Space Agency, which will obtain spectra for a much larger sample of 100,000 asteroids (for 60,000 objects as early as June 2022). Contrary to the spectra obtained from ground-based telescopes, Gaia will obtain spectra at the so-called large phase angles (the Sun-asteroid-observer angle), which will cause significant difficulties in the analysis of the obtained spectra due to the so-called reddening effect of spectra. This effect depends on the light scattering properties of the surfaces of the observed asteroids and so far has been tested only for a dozen or so objects. It causes changes in asteroid spectra, which in extreme cases may lead to incorrect taxonomic classification and incorrect mineralogical composition of asteroids.

In this project, we will use data from large surveys of the sky to determine the reddening effect of the spectra for hundreds of thousands of asteroids, i.e. increasing the asteroid sample with the determined effect by several orders of magnitude. This will allow for this effect to be taken into account when analyzing the spectra from the Gaia mission, as well as those on the ground at larger phase angles. Correcting the erroneous classification of asteroids as well as the incorrect mineralogical composition may lead to changes in the understanding of the primary distribution of elements in the early Solar Nebula, the location of the so-called snow line (distance from the sun beyond which the temperature is so low that water and other volatile substances can only remain in a solid state), places of planetary formation, and thus the formation and evolution of the solar system.