

Cosmic dust (particles with a diameter of micrometres or one millionth of a meter) is one of the most important elements of the Universe. It is an essential component during star-formation processes and the basic building material of planetary systems, but also one of the remains of massive stars after their death. It carries a lot of important information about the evolution of galaxies and about the mechanisms taking place inside of them. Unfortunately, it can also hide this information from us, which is why it is very important to observe at wavelengths at which its radiation passes without obstacles. Dust consists of heavy elements, e.g. carbon, oxygen, iron, and it can be produced by stars at the late stages of their evolution, or it can grow in the interstellar medium.

The amount of dust observed in galaxies is a reflection of how active these galaxies are in terms of star formation. The more stars are formed, the more dust is created. But the mystery is how dust is removed from galaxies. Elliptical galaxies, old objects with ellipsoidal shape, without a clear internal structure are extremely interesting in this matter. They consist mainly of low-mass old stars and no significant star-formation processes occur in them. Hence, they usually do not have much dust in them. However, there are some elliptical galaxies that have a lot of dust. The detection of such galaxies was possible with the Herschel Space Observatory, conducting infrared observations. The goal of this project is to measure the dust removal timescale and its dependence on elliptical galaxies properties, e.g. the shape of galaxies, the proximity of other galaxies (environment), their mass etc.

There are several reasons for us to address this topic. Hitherto, research on dust removal by galaxies was mainly based on simulations. Simulations can describe this problem in details, but at the same time it is possible to get contradictory result, due to incorrect startup parameters. That is why the analysis of observational data which reflect the mechanisms of dust removal is so important. So far, only several dozens of dusty elliptical galaxies have been studied.

This project involves the analysis of almost 3000 elliptical galaxies, for which the Herschel Space Observatory measured dust emission. Such a large sample will allow studying in details the relationship between the rate of dust loss and the physical properties of elliptical galaxies. Thousands of objects, and for each of them hundreds of derived properties will allow describe the mechanism of the dust loss in elliptical galaxies, which will be the most substantial result of this project.