It is commonly said that we live in the golden era of astronomy. The increase of public-access data is huge and everyone with a good idea is able to quickly achieve valuable scientific results. Particularly rapid progress is observed in the satellite technology. More and more missions is being sent into space providing high-quality photometric observations. One of the recent examples of such missions is TESS project, whose main purpose is to detect Earth-like exoplanets. To achieve this goal, the satellite needs to observe a very large number of stars (almost the whole sky in practice) for quite a long time. As a result, light curves are produced i.e. the information how a star changes its brightness with time. Such data are perfect for studies of pulsating stars in which periodic light changes are caused by pulsations. In the present project, two types of pulsating stars will be investigated: high-amplitude δ Scuti (HADS) stars and SX Phoenicis stars. The former are in the first stages of their evolution so they are relatively young. The latter are much older and are most likely a product of a coalescence of two stars. Changes in brightness of the two above-mentioned types are very similar and distinguishing them only by the shape of their light curves causes a great challenge. Spectroscopic observations come with aid — thanks to them, it is possible to determine chemical composition of stars and their radial velocities. These are the quantities that clearly differentiate HADS stars from SX Phoenicis stars. Spectral analysis of at least a few dozens stars of both types is going to be one of the tasks in this project.

HADS and SX Phoenicis stars are so-called classical pulsating stars which follow period-luminosity relation that can be used to determine their distances. In this project we are going to focus on the attempt of finding a dependence that is known for another group of pulsation stars — RR Lyrae stars. It is a relation between the shape of the light curve and metallicity. We are going to check if such dependence exists also for HADS and SX Phe stars. If this is the case, it would allow determination of the metallicity of pulsating HADS/SX Phoenicis stars solely from the photometry which is easy to obtain for a vast number of variables of the two types. Statistical studies of stellar populations which include those stars would then become possible.