Hot subdwarf stars are objects of the extended horizontal branch. They burn helium into carbon and oxygen in their cores. The effective temperatures and logarithm of surface gravities range between 20000 and 30000K, and 5 and 6, respectively. The evolution of these stars is somehow known but the most important phenomenon of that evolution, which is the mechanism of the hydrogen envelope ejection, is still a puzzle. According to our current knowledge the loss should occur on the red giant branch, just before the helium flash.

Hot subdwarfs can pulsate. The mechanism responsible for driving stellar oscillations in hot subdwarfs is the kappa mechanism. It is based on the so-called Z-bump and works in the layer of 200000K. Pulsations allow for applying asteroseismology to study stellar interiors, the part of stars that is not easy accessible with other methods. Hot subdwarfs pulsate in both gravity and pressure modes. In order to derive reliable theoretical models of the stars, a mode identification of the pulsation modes detected in a specific star must be made. The identification is equal to a description of modal geometry. Since the distances to the stars are so large, we cannot see the details of the stellar disk and that is why we have to rely on indirect observations. The examples are rotationally split multiplets and equally spaced radial overtones. When the geometry is constrained, evolutionary and pulsation models can be calculated in order to derive both the global and internal parameters of the stars. Models that correctly predict pulsation periods detected in the stars, represent sets of stellar parameters, which can be used to speculate about stellar structure and evolution.

Hot subdwarfs exist as single stars or in binary systems. The population of both types is important for testing the evolutionary channels. In addition, a pulsating sdB star in a binary system allows for independent derivation of global parameters, one through the orbit and one through asteroseismology. These two ways can also complement each other.

In the project we propose we aim at understanding the structure and evolution of hot subdwarf stars. We can obtain our goal through increasing the sample of pulsating hot subdwarfs, particularly those that show features, which are useful for mode identification. Then, we will calculate evolutionary and pulsation models, which will be useful to understand pulsations in objects locate din different populations, i.e. thin and thick disks, halo. Finally, we will estimate the population of hot subdwarfs in binary systems to test evolutionary channels, which lead to the episode of hydrogen envelope ejection.