Open star clusters contain tens to hundreds of thousand of gravitationally bound stars. Several hundred clusters are known from our own Galaxy, and many are popular objects for amateur observers. The most famous, and easiest to see with the unaided eye, is the Pleiades cluster in Taurus. Other good examples are NGC 3532 in Carina, NGC 4755 (the 'Jewel Box') in Crux, M44 (Praesepe, also known as the Beehive) in Cancer, M6 in Scorpius and, for northern hemisphere sky-watchers, the double cluster h and chi Persei. In older publications they are usually called 'galactic clusters,' because we see them inside the body of our Galaxy, but now it is more common to refer to them as 'open clusters' because their member stars are much less concentrated than those of globular clusters. They are different from globulars in many other respects too: they have loose structures, the brightest stars are mostly blue in color; they are irregular in shape and there is a great range in size (1-20 pc) and in the number of members; their distribution is concentrated around the galactic plane. Many of the younger clusters contain gas and dust. Most open clusters are young: generally less than a few hundred million years old.

In this project, we will focus on hot subdwarfs in two clusters, NGC6791 and NGC6819. These are old, metal-rich and numerous in stars, open clusters. They were observed with the Kepler spacecraft in the long cadence mode for over 4 years. We expect to find more than a dozen or so hot subdwarfs that reside in binaries and/or pulsate. Finding more such stars has a significant impact on our understanding of those objects in old open clusters. In addition to already existing photometry, we will observe new variable stars spectroscopically and will derive their parameters in the combined analysis of both photometric and spectroscopic data. These parameters will help us to better estimate e.g. age, metallicity, distance to these clusters, and, using the O-C analysis, to detect planets.

Since all stars in a given cluster formed from the same diffuse nebula, they are all of similar initial chemical composition. The process of formation takes only a relatively short time compared to the overall lifetime of the cluster, therefore all members are of similar age. Since the diameter of a distant cluster is small relative to its distance from the Earth, to a first order approximation, all the stars may be regarded as being at the same distance. Common properties of all members of a cluster makes a sample of stars uniform and allow us to draw conclusion about the entire formation which propagates to our knowledge of our Galaxy.