One of the significant manifestation of the solar corona variability are so-called quasi-periodic pulsations (QPPs). Those are nearly periodic changes of intensity of electromagnetic radiation observed on the solar flares light curves. This phenomena is most pronounced in the hard X-ray and microwave radiation.

The aim of this project is to analyze solar flares associated with the quasi-periodic pulsations. My studies are intended to answer the questions: what is the cause of QPPs and what affects its evolution.

Selected flares observed by the RHESSI and AIA/SDO instruments simultaneously will be analyzed. We will especially focus on partially occulted flares. Those are the flares situated on the edge of the solar disk in such way that the lower parts of the flaring loop is located on the side of the sun not visible from the Earth. Such flares are therefore ideal for investigating the loop-top sources of hard X-ray radiation.

During the analyze of the hard X-ray light curves we will determine the basic characteristics of the observed QPPs: their periods, amplitude, moments of appearance and disappearance of pulsation. The parameters of the plasma responsible for the formation of QPPs, such as temperature, density or magnetic field intensity will be determined. The analysis of relationships between changes in the hard X-rays and ultraviolet light will be carried. We will also checked whether changes in the brightness are accompanied by changes of the plasma density. The observations will be compared with the predictions of theoretical models which may help us determine which mechanism is responsible for the formation of QPPs.

In order to fulfil the project tasks the SolarSoft/ IDL (Interactive Data Language) software will be used. This software is widely used in heliophysic domain. In addition, we will applied own IDL procedures/ computer codes prepared within the project as well as existing ones. The participants of the project are experienced in scientific researches involving above-mentioned satellite data and analysis tools.

The results will allow us to better understand the phenomenon of quasi-periodic pulsations, and solar flares as well. It must be remembered that solar flares can interact in a very significant way with our planet. While reaching the Earth the very high energetic particles that are release in this phenomena can cause auroras, radio interference, and in extreme cases can damage power grids, satellites or endanger the life and health of astronauts. Therefore, the study of solar flares and the associated processes is very important not only because of the growth of our knowledge, but also for economic reasons.

Our results will be presented at international conferences and published in reviewed astronomical journals. The results will also be a part of the PhD thesis of MSc Żaneta Saforz.