Astronomy, or the study of the Cosmos, has fascinated the human being since the antiquity. The observation of visible light has been the traditional method to perform astronomy. However, thanks to the technological advances in the last century, we have extended the possibilities of exploration to other forms of electromagnetic radiation. Within the electromagnetic spectrum, gamma rays constitute the most energetic radiation. Currently, we know that the most extreme and violent phenomena in the Universe produce gamma rays. Therefore, the observation of gamma rays is crucial to understand the extreme environments where these gamma rays are produced.

Among the different sources producing gamma-rays there is one that outshines the rest, the gamma-ray bursts (GRBs). GRBs are highly energetic explosions characterized by being unpredictable, both in time and location in the sky. The gamma-ray observations in the energy range between 100GeV to 1TeV is crucial to understand the physics of the most powerful sources in the Universe.

Considering the current gamma-ray observatories, HAWC (High Altitude Water Cherenkov Observatory) is probably the one best suited to study this particular energy band. The HAWC Observatory is located in Mexico, at an elevation of 4100m. HAWC consists of an array of 300 water Cherenkov detectors that detect cascades of particles initiated by gamma rays. With that information the energy and the direction of the primary gamma ray can be reconstructed. This information can afterwards be used to estimate the flux of particles coming from specific gamma-ray sources.

The sensitivity of HAWC at energies around hundreds of GeV is known to have still a lot of room for improvement. The goal of this proposal is ameliorate the sensitivity of HAWC in that particular energy range in order to be able to increase the chances of detecting GRBs. The planned changes are mainly at software level, refining the current event reconstruction and data selection. We also plan to explore the impact of specific hardware changes in the detector with the same goal.

A positive detection of GRBs in the GeV-TeV range by HAWC would have a huge impact for the astroparticle physics because it can provide key information about the emission and particle acceleration processes that are taking place in such extreme environments.