Neutrinos and their anti-brothers antineutrinos are mysterious, elusive particles. They are the second, after photons the particles of light, the most common in the universe, essential for forming galaxies and responsible for driving the supernova explosions that disperse "star dust", the elements we are all made of. Billions of them are passing now through you and me in one second, and they do not hurt us! They can interact only weakly, so weakly that we do not feel it. There are three types of neutrinos known: electron neutrino ($\nu_e$), muon neutrino ($\nu_\mu$) and tau neutrino ($\nu_\tau$). Their anti-brothers are represented by electron antineutrino ($\bar{\nu}_e$), muon antineutrino ($\nu_\mu$) and tau antineutrino ($\nu_\tau$). Those elementary particles carry no charge, and their masses are very, very small, which makes it hard to detect, but they are very important as they can help us to understand the way the Universe was created. The last 20 years for neutrino physics were very exciting. We could observe in the large experiments that neutrinos change identities, which is called by physicists as oscillations of neutrinos or antineutrinos. Last year Nobel Prize in Physics was awarded to Takaaki Kajita in Japan and Arthur B. McDonald in Canada, for their key contributions to the experiments which demonstrated that neutrinos oscillate. This metamorphosis requires that neutrinos have mass. The discovery has changed our understanding of the innermost workings of matter and can prove crucial to our view of the Universe. Currently there are several experiments running which want to measure oscillations as precise as possible. Some of them, like Tokai-2-Kamioka (T2K) experiment, have received in 2016 prestigious Breakthrough Prize in Fundamental Physics. This prize was shared between T2K collaborators for their exceptional work and dedication to the experiment.

There are still open questions and puzzles concerning those important elementary particles. One of them is the devoted to an idea called charge-parity (CP) symmetry in the neutrino and antineutrino sector. The idea is to check if oscillations for neutrinos are the same as for antineutrinos. There are large experiments which would like to address this puzzle. The T2K experiment in Japan watches for these oscillations as neutrinos and antineutrinos travel between the J-PARC (Japan Proton Accelerator Research Complex) accelerator in Tokai and the Super-Kamiokande neutrino detector in Kamioka, 295 kilometres away. It began operating in February 2010 and since then it is collecting data to measure precisely the oscillations of a kind: $\nu_\mu \rightarrow \nu_e$ for neutrinos and $\bar{\nu}_\mu \rightarrow \bar{\nu}_e$ for antineutrinos.

The search for CP phase violation will be even more accurate if we add information from the study of atmospheric neutrino oscillations in the Super-Kamiokande detector. Such a combined oscillation analysis using neutrinos from the T2K beam and atmospheric neutrinos is the subject of research in the proposed project.

The general objective of this project is to to form an active group at University of Warsaw, Faculty of Physics participating in one of the very important and successive experiment Super-Kamiokande and prepare this group for the significant contribution to the next generation experiment using the same technology, but much bigger Hyper-Kamiokande and heading for the answer to basic question in fundamental physics: is CP symmetry violated in leptonic sector or is it conserved?