Project:
Theoretical description of quasi-elastic neutrino-nucleon scattering

Neutrino are light very weakly interacting particles. But they are capable to transfer information about physical processes which happen in extreme conditions like in the core of a nuclear reactor, inside the Sun, in Supernovae explosions etc. Scientists have discovered that neutrinos of one kind can transform into other two kinds during their flight [Nobel Prize 2015]. This phenomenon is called neutrino oscillations. Several types of detectors are used to catch neutrino. A lot of neutrino physics experiments are running all over the world. The continuously growing experimental precision challenges us to provide a more and more accurate theoretical description of the interaction of neutrinos with ordinary matter.

The aim of the project is to study different effects in the quasi-elastic neutrino-nucleon scattering processes (\nu + n -> e + p  and \nu + n -> \mu + p). In these processes neutrino weakly interacts with a neutron leading to creation of an electron (or muon) and a proton. An accurate description of these processes is required for modern experiments with reactor neutrinos. Within the project we will investigate the literature on nucleon form factors which are relevant for the processes under consideration. Simple exercises within Quantum Field Theory (drawing of Feynman diagrams, phase space evaluation, calculation of differential distributions etc.) will be performed.

Literature: Article "Neutrino" in Wikipedia and references therein.
Basic background knowledge in Quantum Field Theory is desirable.