“Search for Baryon Number Violation at European Spallation Source (ESS)”

Neutron can be a Majorana particle as was originally conjectured by E. Majorana. It might reveal its nature in the transformation of neutron to antineutron that would be a signal of Baryon number violation with Delta B=2. Violation of Baryon number is required both by the mechanism of inflation and for generation of matter-antimatter asymmetry in the universe. State-of-the-art experiment for neutron-antineutron oscillation search performed twenty years ago by the Collaboration of Padova-Pavia-Heidelberg-Grenoble at the ILL reactor in France had set a limit for the transformation of matter to antimatter. More than 1000 times an improvement can be made in the sensitivity of neutron-antineutron search at the new European Spallation Source (ESS) that will be constructed by the end of this decade near Lund in Sweden. A new N-Nbar search Collaboration is presently being formed in Europe to perform this spectacular search at ESS with cold neutron beam of high intensity. If neutron-antineutron transformation will be found, it will settle the mechanism for the generation of baryon asymmetry of the universe at the post-sphaleron scale, thus making a testable alternative to the untestable idea of leptogenesis. Such a mechanism can also reveal itself with an observation of new heavy scalar states at LHC. In the new ESS experiment due to unique signature of the antineutron annihilation, in a zero-background detector one observed event can be a discovery. One of the essential components of the detector for the antineutron appearance observation will be a calorimeter in the design and construction of which the TTU physicists can contribute their unique experience.

Refreshments at 3:00PM in SC 103