GPPU seminars

Time and Date: 13:00-15:00, Nov 7th, 2023
Place: Room 743, Science Complex B H03 (hybrid)

Registration:"https://us02web.zoom.us/meeting/register/tZErf-mopjkvH9Lh2YCIGxNTUf7rXC5710FD"

1) "The anomaly constraint on effective field theories"

2) "Neutrino emission associated with late-time emissions of gamma-ray bursts"

1) Takahiro Yokukura (D1, Particle Physics); 2) Riki Matsui (D2, Astronomy)

1) Solving QCD is one of the important problems in theoretical physics. However, it is difficult to solve it completely because of strong coupling. We can get constraints on the IR physics by 't Hooft anomalies even if we do not solve it completely. In particular, some kinds of anomalies, which are called an anomaly in the space of coupling constants, constrain not only effective field theories (EFTs), but also the phase diagram. In our recent paper, we have shown that there is the anomaly in the space of coupling constants in QCD case. In this talk, I will discuss implications from the anomaly above. We focus on a possibility of a conformal field theory as the EFT.

2) Gamma-ray bursts (GRBs) often have late-time emission components lasting 100-1000 seconds after the burst, such as extended emission of short GRBs and X-ray flares of long GRBs. These components, emitted by the relativistic jet, could be affected by the materials around the jet. The materials of the progenitor star or the ejected material interact with the jet, leading to the formation of a cocoon-shaped structure. 100-1000 seconds after the burst, the cocoon can cover the emission region of the jets, and photons filled in the cocoon should diffuse into this region. We have calculated the neutrino emission associated with the late-time emission of GRBs, taking into account the interactions between the cocoon photons and the cosmic rays accelerated in the jets. The cocoon photons enhance the neutrino production efficiency in the PeV - EeV energies. The talk includes the detectability of the neutrinos by IceCube and IceCube-Gen2 and its parameter dependency.