Contribution ID: **31** Type: **not specified**

Implications of microscopic black holes in neutrino telescopes, FCC and the early Universe

Wednesday 9 December 2020 15:10 (20 minutes)

If the length scale of possible extra dimensions is large enough, the effective Planck scale is lowered such that microscopic black holes could be produced in collisions of high-energy particles, which opens up a plethora of novel phenomena in terrestrial detectors and in the early Universe. Microscopic black holes from high-energy cosmic neutrino-nucleon collisions are characterized by unique topologies, distinct energy distributions and unusual ratios of hadronic-to-electronic energy deposition, visible through Cherenkov light echos due to delayed neutron recombination in IceCube-like detectors. In addition, these black holes evaporate through the emission of all particles that are kinematically and thermally allowed, including dark matter. This enables us to study the properties of dark sector from the missing momentum signatures at the next generation of colliders, regardless of the strength of the coupling between dark matter and the Standard Model. The dark matter produced from microscopic black hole decay in the early Universe may account for part or all the dark matter relic density today if the reheating temperature is close to the Planck scale in the bulk, which serves as a new dark matter production mechanism even in the absence of non-gravitational dark matter-Standard Model coupling.

Author: SONG, Ningqiang (Queen's University)

Co-authors: VINCENT, Aaron (Queen's University); MACK, Katherine (North Carolina State University)

Presenter: SONG, Ningqiang (Queen's University)

Session Classification: Contributed talks