Kouichi Hirotani, Int J Phys Stud Res. 2018
http://dx.doi.org/10.18689/2639-0426.a1.002

madridge CONFERENCES
European
Physics Conference 2018
December 6-7, 2018 Valencia, Spain

Lightning Black Holes as Unidentified TeV Sources

Kouichi Hirotani
Academia Sinica Institute of Astronomy and Astrophysics (ASIAA), Taiwan

Imaging Atmospheric Cherenkov Telescopes have revealed more than 100 TeV sources along the Galactic Plane, around 45 per cent of them remain unidentified. However, radio observations revealed that dense molecular clumps are associated with 67 per cent of 18 unidentified TeV sources. In this talk, we propose that an electron-positron magnetospheric accelerator emits detectable TeV gamma-rays when a rapidly rotating black hole enters a gaseous cloud. Since the general-relativistic effect plays an essential role in this magnetospheric lepton accelerator scenario, the emissions take place in the direct vicinity of the event horizon, resulting in a point-like gamma-ray image. We demonstrate that their gamma-ray spectra have two peaks around 0.1 GeV and 0.1 TeV and that the accelerators become most luminous when the mass accretion rate becomes about 0.01 per cent of the Eddington rate. We compare the results with alternative scenarios such as the cosmic-ray hadron scenario, which predicts an extended morphology of the gamma-ray image with a single power-law photon spectrum from GeV to 100~TeV.

Biography:

Kouichi Hirotani investigated plasma phenomena in strong gravitational field around black holes and neutron stars. He awarded the DSc degree from Nagoya University on his research on general relativistic magnetohydrodynamic accretion onto rotating black holes. After that, He studied the gamma-ray emissions from pulsar magnetospheres by developing a numerical code that solves the set of stationary Maxwell-Boltzmann equations in National astronomical observatory in Japan, NASA/GSFC in the USA, MPI-Kernphysik in Heidelberg, Germany, and ASIAA in Taiwan. He applied the same method to black-hole magnetospheres and am investigating very high energy emissions from the direct vicinity of the event horizon.