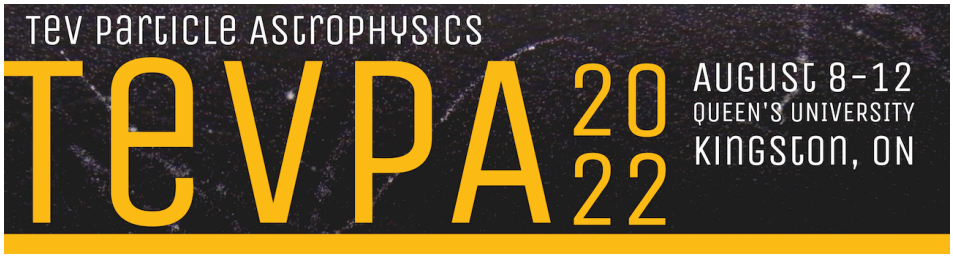

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Neutrino Emission during Supermassive and stellar mass Binary Black Hole Mergers

Thursday 11 August 2022 14:40 (20 minutes)

The diffuse astrophysical neutrino flux was first detected by IceCube in 2013. With the high-probability association of a high-energy neutrino to the blazar TXS0506+056 in 2017 and several more neutrino-blazar associations since then, there is an indication that at least a non-negligible part of this diffuse neutrino flux originates from blazars.
As over ninety stellar mass binary black hole mergers were already detected via gravitational waves, with more to come, there are strong indications that supermassive black holes in galaxy centers, and thus blazars, also merge and have undergone at least one merger in their lifetime. Such a merger is almost always accompanied by a change of observable jet direction, leading to interactions of a preceding jet with surrounding molecular clouds and therefore neutrino productions.
By creating a connection between the emitted energy in form of neutrinos and gravitational waves in each merger of binary supermassive and stellar mass black holes, we estimate their contributions to the diffuse neutrino flux that is measured by IceCube. As neutrino production is directly connected to high energy cosmic ray interactions, the contribution of these sources to the injection rate of cosmic rays is established.

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