

Formation channels of black hole mergers: isolated binaries or clusters?

The latest catalog of gravitational wave events, GWTC-3 counts almost a hundred black hole mergers. With this growing sample, it is now becoming possible to get the first hints of the formation channels of these mergers. In our current understanding, most of these merging black holes either formed in an isolated binary or in a dynamically rich environment such as globular or nuclear clusters. From theoretical models, we expect that both channels lead to different distributions of the masses and spins of the merging sources, as well as a different redshift evolution of the rate. Preliminary analysis by different groups suggests that both formation channels contribute significantly to the observed events. However, direct comparisons are difficult as they require consistent modeling of both channels as well as a solid statistical framework to compare with the observed events. In this presentation, I will introduce the COSMERGE project, which will model mergers from both channels based on a large scale cosmological simulation. I will present intermediate results comparing both channels in a galaxy like our Milky Way.