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Evidence for Dark Matter Density Spikes Surrounding Black Holes

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It has been suggested for a long time that dark matter would form a density spike around a black hole. However, no promising evidence has been observed so far to verify this theoretical prediction. In this talk, I will report the evidence of showing the existence of a dark matter density spike surrounding each of the two nearby stellar-mass black holes (A0620-00 and XTE J1118+480) and in the supermassive black hole binary OJ287. The dynamical friction between dark matter and the companions can satisfactorily explain the observed orbital decays in the binaries. The spike index constrained is consistent with the theoretical prediction. The interplay between dark matter and black holes provides important information for constraining the properties of dark matter.

Author: CHAN, Man Ho

Presenter: CHAN, Man Ho

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