

Why Are Galaxies without Black Holes Uncommon?

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Recent calculations indicate that when two galaxies, and the supermassive black holes that lie at their centers, merge, these galactic 'marriages' frequently produce gravitational forces strong enough to kick the new combined black hole right out of its merged galaxy. However, so far, none of the many 'empty nest' galaxies predicted by such calculations have been found.

Now researchers at the University of Maryland say merged black holes probably are kicked out far less often than predicted because torques from the vast accretion disk of parental galactic material that spins around and feeds merging black holes act to align their spins in a way that reduces the kick force.

In findings presented today during a press briefing at the American Astronomical Society's meeting in Honolulu Hawaii, Maryland astronomers Tamara Bogdanovic and Christopher Reynolds propose that in the majority of gas-rich galactic mergers, torques from gas accretion align the spins of supermassive black holes and their orbital axis with a large-scale gas disk. This mechanism, they say, helps explain the ubiquity of black holes at the center of galaxies despite the potentially large kicks from gravitational radiation recoil.

"While we expect a black hole ejection to be uncommon in the aftermath of gas-rich mergers, it is still possible that it may happen, especially in merging galaxies that are relatively gas-poor. Future observations of such gas-poor mergers may point to a class of massive

galaxies without a central supermassive black hole," said Bogdanovic.

"What we have uncovered here is a remarkable interaction between the galactic scale gas disk and the comparatively tiny black holes." added Reynolds.

Source: University of Maryland

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