

Smashing News on Black Holes

Essay by Alister Graham

WHEN WE LOOK OUT INTO THE BIG, WIDE UNIVERSE, things often seem peaceful and unchanging. This is largely because of the enormous span of time needed for cosmic events to occur. But the universe is actually a dynamic, and at times violent place, such as when two galaxies collide.

For decades, astronomers have known that the collision of galaxies leads to the formation of new, much larger galaxies. Many of the galaxies involved in these collisions already have “supermassive” black holes in their cores. What is fairly new is the realisation that the black holes leave a trace as they quickly sink to the centre of the new galaxy, where they combine to form an even bigger black hole.

There are numerous examples of such galaxies caught in the throng of galactic wed. The two pictured here — known as NGC 2707 and IC 2613 — are having a close encounter, leading to stars and gas being flung in all directions. Give them a couple of billion years, and they should have merged into one.

However, a recent analysis of images taken with the Hubble Space Telescope, has shown the universe to be ten times less violent — in terms of major galaxy mergers — than previously thought.

The new insight has come from the observation that the biggest galaxies appear to be largely devoid of stars at their cores. Such depletion is thought to arise from the disruption caused by the black holes (from the smaller galaxies) as they coalesce at the centre of the new galaxy.

Image of colliding galaxies NGC 2707 and IC 2163 taken by the Hubble Space Telescope (www.stsci.edu)

Such cosmic wrecking balls have been known to suck in and devour stars that venture too close. But much of the stellar elimination process occurs because the black holes act like giant gravitational slingshots, ejecting stars away from the galaxy cores.

However, many galaxies have large central black holes but no depleted cores. It's therefore not the case that every black hole is formed simply by gobbling up its surrounding stars.

Although our own galaxy — the Milky Way — has swallowed up many smaller galaxies in the past, it has not yet experienced a major merger. But that isn't to say it won't happen. The Milky Way is expected to smash into our nearest big neighbour — the spiral galaxy, Andromeda — in about three billion years from now. Intriguingly, due to the huge distances between individual stars, it is unlikely our Solar System would actually crash into any Andromedan stars during this process. But there would be plenty of new constellations to name. *

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