

Chaotic jumble of merging spiral galaxies hints at possible fate of Milky Way and Andromeda galaxies

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Gemini South, one half of the International Gemini Observatory operated by NSF's NOIRLab, captures the billion-year-old aftermath of a double spiral galaxy collision. At the heart of this chaotic interaction, entwined and caught in the midst of the chaos, is a pair of supermassive black holes—the closest such pair ever recorded from Earth. Credit: International Gemini Observatory / NOIRLab / NSF / AURA; Image processing: T.A. Rector (University of Alaska Anchorage / NSF's NOIRLab), J. Miller (International Gemini Observatory / NSF's NOIRLab), M. Rodriguez (International Gemini Observatory / NSF's NOIRLab), M. Zamani (NSF's NOIRLab)

The swirling arms of a spiral galaxy are among the most recognized features in the cosmos: long sweeping bands spun off from a central core, each brimming with dust, gas, and dazzling pockets of newly formed stars. Yet this opulent figure can warp into a much more bizarre and amorphous shape during a merger with another galaxy. The same sweeping arms are suddenly perturbed into disarray, and two supermassive black holes at their respective centers become entangled in a tidal dance. This is the case of NGC 7727, a peculiar galaxy located in the constellation of Aquarius about 90 million light-years from the Milky Way.

Astronomers have captured an evocative image of this merger's aftermath using the Gemini Multi-Object Spectrograph (GMOS) mounted on the Gemini South telescope in Chile, part of the International Gemini Observatory operated by NSF's NOIRLab. The image reveals vast swirling bands of interstellar dust and gas resembling freshly-spun cotton candy as they wrap around the merging cores of the progenitor galaxies. From the aftermath has emerged a scattered mix of active starburst regions and sedentary dust lanes encircling the system.

What is most noteworthy about NGC 7727 is undoubtedly its twin

[galactic nuclei](#), each of which houses a supermassive black hole, as confirmed by [astronomers](#) using the European Southern Observatory's Very Large Telescope (VLT). Astronomers now surmise the galaxy originated as a pair of spiral galaxies that became embroiled in a celestial dance about one billion years ago. Stars and nebulae spilled out and were pulled back together at the mercy of the black holes' gravitational tug-of-war until the irregular tangled knots we see here were created.

The two [supermassive black holes](#), one measuring 154 million solar masses and the other 6.3 million [solar masses](#), are approximately 1,600 light-years apart. It is estimated that the two will eventually merge into one in about 250 million years to form an even more massive black hole while dispersing violent ripples of gravitational waves across spacetime.

Because the galaxy is still reeling from the impact, most of the tendrils we see are ablaze with bright young stars and active stellar nurseries. In fact, about 23 objects found in this system are considered candidates for young globular clusters. These collections of stars often form in areas where star formation is higher than usual and are especially common in interacting galaxies as we see here.

Once the dust has settled, NGC 7727 is predicted to eventually become an elliptical galaxy composed of older stars and very little [star formation](#). Similar to Messier 87, an [elliptical galaxy](#) with a [supermassive black hole](#) at its heart, this may be the fate of the Milky Way and the Andromeda Galaxy when they fuse together in billions of years' time.

Provided by NOIRLab

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