3 GALAXY COLLISIONS

Like majestic ships in the grandest night, galaxies can slip ever closer until their mutual gravitational interaction begins to mold them into intricate figures that are finally, and irreversibly, woven together. It is an immense cosmic dance, choreographed by gravity.

NGC 3256

NGC 3256 is an impressive example of a peculiar galaxy. The telltale signs of the collision are two extended luminous tails swirling out from the galaxy. NGC 3256 belongs to the Hydra-Centaurus supercluster complex and provides a nearby template for studying the properties of young star clusters in tidal tails. The system hides a double nucleus and a tangle of dust lanes in the central region. The tails are studded with a particularly high density of star clusters.

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When two or more galaxies collide, it’s not like marbles hitting each other. The individual components of galaxies — stars, dust, gas, dark matter — are spread widely and may pass unharmed through the collision. At worst, gravity will fling them outwards, creating long streamers that stretch for a hundred thousand light-years or even more.

The colliding galaxies themselves, trapped in their deadly gravitational embrace, will continue to orbit each other, ripping out gas, stars, and creating trails of matter in the cosmos. Eventually, hundreds of millions of years later, the galaxies involved in the collision will settle into one single, combined galaxy. It is believed that most if not all present-day galaxies, including the Milky Way, were formed from such a coalescence of smaller galaxies, occurring over billions of years.

Cosmologists think that this is how galaxies grow, through an intricate process of continuous mergers. Galaxies grow bigger by devouring smaller ones, dwarf galaxies being the favorite meals of larger galaxies.

More common in the early universe than they are today, galaxy mergers are thought to be a primary driving force of cosmic evolution, sparking frenetic births and explosive stellar deaths. Our own Milky Way contains the debris of the many smaller galaxies it has encountered and devoured over billions of years. But even our galaxy is not at the top of the food chain (see Chapter 5).

The First Observations

Our usual impression of the starry night sky is that of a nearly motionless dome. A single human life span is just the blink of an eye on a cosmological time scale. In reality, the universe is like a churning cauldron, in constant movement, but we would need to watch it for vastly longer than a lifetime to perceive the motions of most stars and galaxies.