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GALAXIES: THE BIG PICTURE

NGC 5866

This is a unique Hubble view of the disk galaxy NGC 5866 tilted nearly edge-on to our line of sight. Hubble's sharp vision reveals a crisp dust lane dividing the galaxy into two halves. The image highlights the galaxy's structure: a subtle, reddish bulge surrounding a bright nucleus, a blue disk of stars running parallel to the dust lane, and a transparent outer halo. Some faint, wispy trails of dust can be seen meandering away from the disk of the galaxy out into the bulge and inner halo of the galaxy. The outer halo is dotted with numerous globular star clusters, with nearly a million stars in each. Background galaxies that are millions to billions of light-years farther away are also seen through the halo.

Essentially everything we can see in the night sky — whether with the unaided eye or with telescopes — are galaxies, or parts of galaxies. When thinking about galaxies, we need to think BIG: a galaxy is an almost unfathomably large collection of dust, gas, dark matter, planets, and stars — billions of them, packed together by the force of gravity.

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This book is about interacting galaxies, but what is a galaxy? The galaxy we know best is, not surprisingly, the one we live in — the Milky Way. From our vantage point inside our galaxy, it is difficult to have a clear idea of how the Milky Way might look from the outside. Mapping the Milky Way is much like trying to map a crowded, foggy city from a single vantage point inside the murk. It took humankind a long time to establish the existence of the Milky Way and to recognize and acknowledge the existence of other galaxies in the universe.

Discovery of the Milky Way

If you have ever had the opportunity to observe the night sky from a place without light pollution, you will certainly have noticed regions where the concentration of stars is higher — looking like a chalky band crossing the sky behind the stars. When seen from a really dark site, the Milky Way is one of the most amazing displays of nature.

In ancient times there was no scientific explanation for this chalky band. The Vikings saw it as a road walked by the dead to reach heaven; for the Incas it was a river from which the weather god Apu Illapu drew water to make rain; the Egyptians thought it was a great river in the sky or “the Nile in the Heaven.” The Milky Way takes its name from the Latin *Via Lactea*, in turn derived from the Greek Γαλαξίας (Galaxias). In Greek mythology, Hermes, the messenger of the gods, attempted to make the infant Hercules immortal by letting him suckle at the breast of the sleeping goddess Hera, but Hera woke and thrust the baby away, tearing her breast from the baby’s mouth, so that her milk spurted across the sky to form the Milky Way.

Early scientists could not place the Milky Way in their world view, so they tended to ignore it. The first to get close to the true nature of the Milky Way was the Italian Galileo Galilei, who observed it through his newly invented telescope in 1609 and 1610. He was