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The Evolution of Spiral Galaxies

The characteristic shape of spiral galaxies which allows for a picturesque manifold of different individual structures is not only one of the typical features frequently shown in many color photographs taken with modern astronomical telescopes, to explain the origin of the overall shape of galaxies is also one of the most challenging question for astrophysics today.

The talk will introduce to the rich morphology in the world of galaxies and will try to fit our Milky Way Galaxy into this picture. One such typical structure of a spiral or disk galaxy is the central elongated stellar mass distribution called “bar”. It is shown that our Galaxy contains such a structure, too. Starting with the most famous “deepest” image of the Universe, the so-called Hubble Deep Field (HDF), the concept of hierarchical structure formation and the role of merging and interaction is introduced. Comparing objects in the HDF with galaxies in our local Universe however reveals, that not all the structures observed today have been present since the formation of galaxies. It is rather demonstrated that some typical characteristics of spiral galaxies such as bars grow with time by intrinsic processes.

All these different aspects of galaxy formation aim at a better understanding of the relation between dark and baryonic matter in a more general evolutionary description of the Universe.