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Barred spiral galaxy

A **barred spiral galaxy** is a spiral galaxy with a central bar-shaped structure composed of stars. Bars are found in approximately two-thirds of all spiral galaxies.[1] Bars generally affect both the motions of stars and interstellar gas within spiral galaxies and can affect spiral arms as well.[1] The Milky Way Galaxy, where our own Solar System is located, is classified as a barred spiral galaxy.[2]

Edwin Hubble classified spiral galaxies of this type as "SB" (spiral, barred) in his Hubble sequence and arranged them into sub-categories based on how open the arms of the spiral are. SBa types feature tightly bound arms, while SBc types are at the other extreme and have loosely bound arms. SBb-type galaxies lie in between the two. SB0 is a barred lenticular galaxy. A new type, SBm, was subsequently created to describe somewhat irregular barred spirals, such as the Magellanic Cloud galaxies, which were once classified as irregular galaxies, but have since been found to contain barred spiral structures. Among other types in Hubble's classifications for the galaxies are the spiral galaxy, elliptical galaxy and irregular galaxy.

NGC 1300, viewed nearly face-on; Hubble Space Telescope image

Contents

Bars

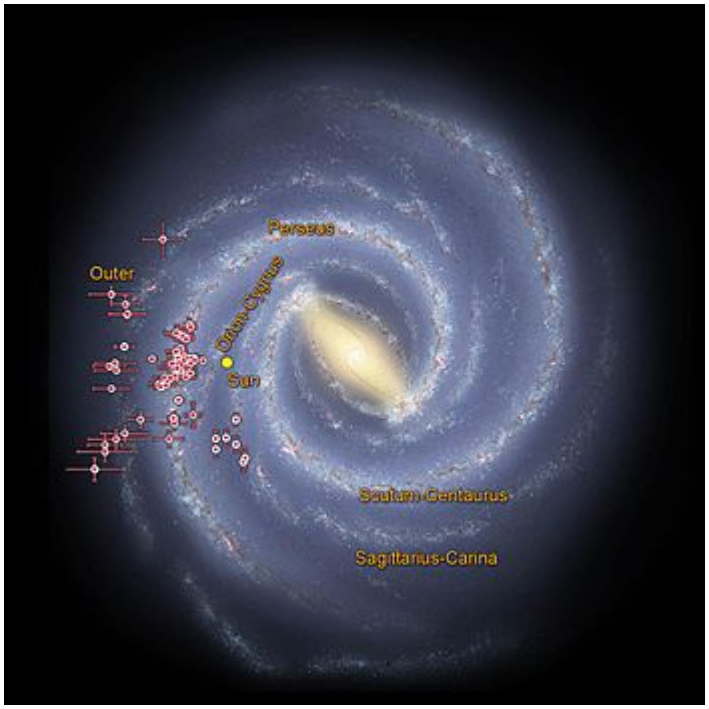
Barred galaxies are apparently predominant, with surveys showing that up to two-thirds of all spiral galaxies contain a bar.[4] The current hypothesis is that the bar structure acts as a type of stellar nursery, fueling star birth at their centers. The bar is thought to act as a mechanism that channels gas inwards from the spiral arms through orbital resonance, in effect funneling the flow to create new stars.[5] This process is also thought to explain why many barred spiral galaxies have active galactic nuclei, such as that seen in the Southern Pinwheel Galaxy.

The creation of the bar is generally thought to be the result of a density wave radiating from the center of the galaxy whose effects reshape the orbits of the inner stars. This effect builds over time to stars orbiting further out, which creates a self-perpetuating bar structure.[6]

Bars are thought to be temporary phenomena in the lives of spiral galaxies; the bar structures decay over time, transforming galaxies from barred spirals to more "regular" spiral patterns. Past a certain size the accumulated mass of the bar compromises the stability of the overall bar structure. Barred spiral galaxies with high mass accumulated in their center tend to have short, stubby bars.[7] Since so many spiral galaxies have bar structures, it is likely that they are recurring phenomena in spiral galaxy development. The oscillating evolutionary cycle from spiral galaxy to barred spiral galaxy is thought to take on the average about two billion years.[8]

Recent studies have confirmed the idea that bars are a sign of galaxies reaching full maturity as the "formative years" end. A 2008 investigation found that only 20 percent of the spiral galaxies in the distant past possessed bars, compared with about 65 percent of their local counterparts.[9]

Barred spiral galaxy IC 5201, located more than 40 million light-years from Earth. It was discovered by Joseph Lunt (http://www.klima-luft.de/steinicke/ngcic/persons/lunt.htm).[3]

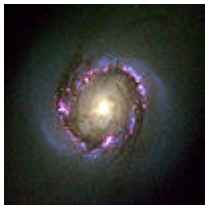


Milky Way Galaxy spiral arms - based on WISE data.

Grades

The general classification is "SB" (spiral barred). The sub-categories are based on how open or tight the arms of the spiral are. SBa types feature tightly bound arms. SBc types are at the other extreme and have loosely bound arms. SBb galaxies lie in between. SBm describes somewhat irregular barred spirals. SB0 is a barred lenticular galaxy.

Examples

Example	Type	Image	Information
NGC 2787	SB0		SB0 is a type of lenticular galaxy
NGC 4314	SBa		
NGC 4921	SBab		
Messier 95	SBb		
NGC 3953	SBbc		
NGC 1073	SBc		
Messier 108	SBcd		

NGC 7640 is a barred spiral galaxy in the Andromeda constellation.[10]

			
NGC 2903	SBd		
NGC 5398	SBdm		SBdm can also be considered a type of barred Magellanic spiral
NGC 55	SBm		SBm is a type of Magellanic spiral (Sm)

Other examples

Name	Image	Type	Constellation
M58		SBc	Virgo
M91		SBb	Coma Berenices
M95		SBb	Leo
M109		SBb	Ursa Major
NGC 1300		SBbc	Eridanus
NGC 1365		SBc	Fornax
NGC 2217		SBa	Canis Major

Magellanic Clouds		SBm	Dorado, Tucana
UGC 12158		SB	Pegasus
NGC 1512[11]		SB(r)ab	Horologium

See also

- Galaxy morphological classification
- Galaxy formation and evolution
- Lenticular galaxy
- Spiral galaxy
- Firehose instability

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