

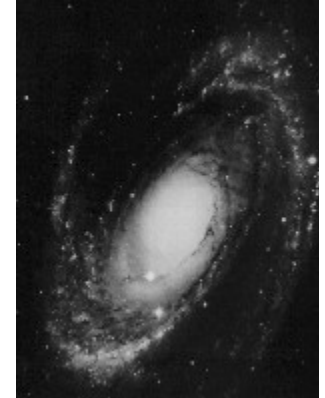


Messier 81

Spiral Galaxy M81 (NGC 3031), type Sb, in [Ursa Major](#)

Bode's Galaxy

Right Ascension	09 : 55.6 (h:m)
Declination	+69 : 04 (deg:m)
Distance	12000 (kly)
Visual Brightness	6.9 (mag)
Apparent Dimension	21x10 (arc min)



Discovered by Johann Elert Bode in 1774.

Messier 81 (M81, NGC 3031) in Ursa Major is one of the most conspicuous galaxies in the sky, and one of the nearest beyond the Local Group. It is a conspicuous spiral galaxy.

M81 is one of the easiest and most rewarding galaxies to observe for the amateur astronomer on the northern hemisphere, because with its total visual brightness of about 6.8 magnitudes it can be found with small instruments.

Brian Skiff of Lowell Observatory [reports](#) that he could see M81 with the unaided naked eye under exceptionally good viewing conditions (i.e., clear dark skies), and is at least the fourth observer who reported to have done so ! Dan Gerhards reports that at the Oregon Star Party of 2006, another two observers have managed to spot it, and knows of a third amateur who claims to have seen it, bringing the total to at least seven observers.

The pronounced grand-design spiral galaxy M81 forms [a most conspicuous physical pair](#) with its neighbor, [M82](#), and is the brightest and probably dominant galaxy of a nearby group called [M81 group](#). A few tens of million years ago, which is semi-recently on the cosmic time scale, a close encounter occurred between the galaxies M81 and M82. During this event, larger and more massive M81 has dramatically deformed M82 by gravitational interaction. The encounter has also left traces in the spiral pattern of the brighter and larger galaxy M81, first making it overall more pronounced, and second in the form of the dark linear feature in the lower left of the nuclear region. The galaxies are still close together, their centers separated by a linear distance of only about 150,000 light years.

M81 is the first of the four objects originally discovered by [Johann Elert Bode](#), who found it, together with its neighbor [M82](#), on December 31, 1774. Bode described it as a "nebulous patch", about 0.75 deg away from M82, which "appears mostly round and has a dense nucleus in the middle," and included it as No. 17 in his list. [Pierre Méchain](#) independently rediscovered both galaxies as nebulous patches in August 1779 and reported them to [Charles Messier](#), who added them to [his catalog](#) after his position measurement on February 9, 1781.

Using the [Hubble Space Telescope](#), a team under Wendy Freedman of the Carnegie Institution of Washington has [investigated 32 Cepheid](#) variables in M81 and determined the distance to be 11.0 million light years, in

1993 well before the HST was refurbished. Together with the new distance scale correction implied by the results of ESA's Hipparcos satellite, the true distance of M81 is probably closer to 12.0 million light years. [See the H0 Key Project Team's work on M81 \(paper 1 and 2, 1994\).](#)

On Sunday, March 28, 1993, [a type II supernova \(1993J\)](#) occurred in M81, which was discovered by the Spanish amateur astronomer Francisco Garcia Diaz from Lugo (Spain), and reached a brightness of about mag 10.5 in its maximum. The [remnant of this supernova](#) was imaged in the radio light at 3.6 cm wavelength from roughly six to 18 months after the explosion, with a global Very Long Baseline Interferometer (VLBI) array of radio telescopes in Europe and North America.

Investigations performed in 1994 have indicated that M81 has probably only little dark matter, as its rotation curve was found to fall off in the outer regions; this is in contrast to many galaxies, including our own [Milky Way](#), for which the rotation curve increases outward. To explain the velocity of the stars in these regions, the galaxy must have a certain amount of mass. However, the total mass observed in luminous matter - stars and nebulae - is typically insufficient to explain this behaviour; thus it is assumed that there is a significant portion of mass in galaxies is non-luminous, dark matter (or at least low-luminosity matter). For M81, the percentage of dark matter is now estimated to be lower than average.

In 1995, Perelmuter and Racine investigated the region around M81 for globular clusters, and found about 70 candidate objects for the globular cluster system of M81 ([Perelmuter and Racine, 1995](#)). They estimate the total population at 210 +/- 30 globulars.

In December 1990, the ASTRO-1 Space Shuttle mission (STS-35) transported telescopes into the Earth's orbit, including the UIT (Ultraviolet Imaging Telescope) which obtained [images of M81](#) (in the ultraviolet light; these were compared with the visible light image, and combined to an interesting and informative overlay; an [animation \[433 k MPG\]](#) showing a morphing from the UV to visual image of M81 is available). Previously, M81's UV radiation had been investigated by the [Soviet Astron](#) orbital observatory. [Bill Keel](#) has assembled a [series of images](#) of M81 in the different parts of the electromagnetic spectrum from the radio part to the X-rays region.

- [Historical Observations and Descriptions of M81](#)
- [Hubble Space Telescope images of M81](#)
- [UIT images of M81 in UV](#)
- [XMM Newton images of M81 in UV](#)
- [Spitzer Space Telescope images of M81 in infrared light](#)
- [More images of M81](#)
- [Amateur images of M81](#)
- [More images of M81 and M82](#)

- [Multispectral Image Collection of M81](#), SIRTf Multiwavelength Messier Museum
- [SIMBAD Data of M81](#)
- [NED Data of M81](#)
- [Publications on M81 \(NASA ADS\)](#)
- [Observing Reports for M81](#) (IAAC Netastrocatalog)
- [NGC Online data for M81](#)

References

- [H0 Key Project](#) materials on M81:
 - [The HST Key Project Archives - M81](#)
 - Wendy L. Freedman *et al.*, 1994. The Hubble Space Telescope Extragalactic Distance Scale Key Project. 1: The discovery of Cepheids and a new distance to M81. *Astrophysical Journal*, Part 1,

vol. 427, no. 2, p. 628-655 [[ADS: 1994ApJ...427..628F](#)].

- Shaun M. Hughes *et.al.*, 1994. The Hubble Space Telescope extragalactic distance scale key project. 2: Photometry of WFC images of M81. *Astrophysical Journal*, Part 1, vol. 428, no. 1, p. 143-156. [[ADS: 1994ApJ...428..143H](#)]
- Jean-Marc Perelmuter and René Racine, 1995. The Globular Cluster system of M81. *Astronomical Journal*, Vol. 109, No. 3, p. 1055-1070 (March 1995) [[ADS: 1995AJ....109.1055P](#)]

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