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GLOSSARY159

Great galaxies in the Great Bear

Spiral galaxies M81 (left) and M82 (right) in northern Ursa Major form a mesmerizing pair through binoculars and small telescopes. GIUSEPPE DONATIELLO/CC0 1.0 UNIVERSAL (CC0 1.0)

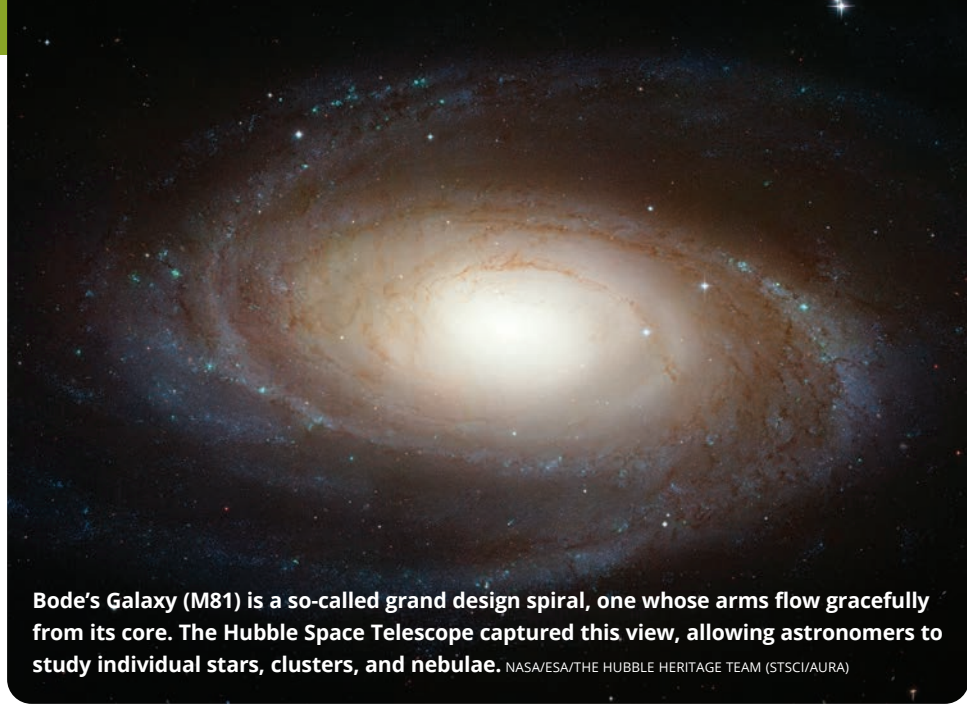
Ursa Major the Great Bear swings high in the north on spring evenings. Like Leo, this constellation holds lots of galaxies for backyard observers. It's easy to compile a list of more than 30 NGC galaxies worth exploring in Ursa

Major; chasing them all down makes for a pleasant night or two of viewing. To find your way around the Great Bear, use its famous asterism—the Big Dipper—as a guide.

Our first two objects lie in far northern Ursa Major.

To find Bode's Galaxy (M81) and the Cigar Galaxy (M82) with binoculars, draw an imaginary line from magnitude 2.4 Gamma (γ) Ursae Majoris (the star at the southeastern corner of the dipper's bowl) through magnitude 1.8





Bode's Galaxy (M81) is a so-called grand design spiral, one whose arms flow gracefully from its core. The Hubble Space Telescope captured this view, allowing astronomers to study individual stars, clusters, and nebulae. NASA/ESA/THE HUBBLE HERITAGE TEAM (STSCI/AURA)

Alpha (α) Ursae Majoris (at the bowl's northwestern corner) and extend it by an equal length. Binoculars show the galaxies well, but they stand out through a telescope. They have to rank as one of the nicest galaxy pairs in the sky.

The galaxies glow at magnitudes 6.9 (M81) and 8.4 (M82). Although a few people with great eyesight have detected M81 with the unaided eye under excellent skies, you need optical aid to do them justice. Both galaxies are easy targets through an 80mm refractor. Bode's Galaxy appears oval with a fairly bright central bulge and an obviously less-populated disk (the spiral arms). The galaxy shows definite spiral structure in large amateur instruments. German astronomer Johann Bode discovered M81 in 1774; Messier added it to his catalog in 1779.

M82 appears far different, even in binoculars. It looks more elongated and has rounded ends, indeed much like a short cigar. Under extremely good conditions, or by using an

8-inch or larger telescope, you may see dust lanes cutting across M82's disk in one or more locations.

Look 0.8° east of M81 and you'll find the magnitude 9.9 galaxy NGC 3077. An 80mm wide-field telescope at low power reveals

this satellite galaxy as a featureless oval glow. Another satellite, magnitude 10.1 NGC 2976, lies 1.7° southwest of M81. You'll have a hard time detecting this galaxy with an 80mm scope unless you have excellent skies.

Bode's Galaxy

Also known as: M81, NGC 3031

Constellation: Ursa Major the Great Bear

Right ascension: 9h56m

Declination: $69^\circ 04'$

Magnitude: 6.9

Apparent size: $21' \times 10'$

Distance: 12 million light-years

The Cigar Galaxy

Also known as: M82, NGC 3034

Constellation: Ursa

Major the Great Bear

Right ascension: 9h56m

Declination: $69^\circ 41'$

Magnitude: 8.4

Apparent size: $9' \times 4'$

Distance: 12 million light-years



The Cigar Galaxy (M82) is a starburst galaxy creating stars at a rate 10 times that of the Milky Way. Notice the plumes of glowing hydrogen erupting from its central regions. NASA/ESA/THE HUBBLE HERITAGE TEAM (STSCI/AURA)

HUBBLE HERITAGE TEAM (STSCI/AURA)



AUTUMN SKY OBJECTS

PAGE	OBJECT NAME	CONSTELLATION	TYPE	R.A.	DEC.	MAG.	SIZE
126	The Saturn Nebula (NGC 7009)	Aquarius	Planetary nebula	21h04m	-11°22'	8.0	1.6'x0.4'
127	The Iris Nebula (NGC 7023)	Cepheus	Reflection nebula	21h02m	68°10'	6.8	18'
128	M15 (NGC 7078)	Pegasus	Globular cluster	21h30m	12°10'	6.2	18'
129	M2 (NGC 7089)	Aquarius	Globular cluster	21h33m	-0°49'	6.5	16'
130-131	The Elephant Trunk Nebula (IC 1396)	Cepheus	Emission nebula	21h39m	57°30'	3.5	170'
132	The Spare Tyre Nebula (IC 5148)	Grus	Planetary nebula	22h00m	-39°23'	11	2'
133	NGC 7209	Lacerta	Open cluster	22h05m	46°29'	7.7	25'
133	NGC 7243	Lacerta	Open cluster	22h15m	49°54'	6.4	21'
134-135	The Helix Nebula (NGC 7293)	Aquarius	Planetary nebula	22h30m	-20°50'	7.3	20'
136-137	The Bubble Nebula (NGC 7635)	Cassiopeia	Emission nebula	23h21m	61°12'	10	15'
136-137	M52 (NGC 7654)	Cassiopeia	Open cluster	23h25m	61°36'	6.9	13'
138	The Blue Snowball Nebula (NGC 7662)	Andromeda	Planetary nebula	23h26m	42°32'	8.3	2.2'
139	NGC 7822	Cepheus	Emission nebula	0h01m	67°25'	5.7	100'
140	The Whale Galaxy (NGC 55)	Sculptor	Spiral galaxy	0h15m	-39°12'	7.9	32'x6'
141	NGC 147	Cassiopeia	Dwarf spheroidal galaxy	0h33m	48°31'	9.5	13'x8'
141	NGC 185	Cassiopeia	Dwarf spheroidal galaxy	0h39m	48°20'	9.2	12'x10'
142-143	The Andromeda Galaxy (M31)	Andromeda	Spiral galaxy	0h43m	41°16'	3.4	180'x65'
144	The Skull Nebula (NGC 246)	Cetus	Planetary nebula	0h47m	-11°52'	8	3.8'
144	NGC 255	Cetus	Spiral galaxy	0h48m	-11°28'	11.7	3'x2'
145	The Claw Galaxy (NGC 247)	Cetus	Spiral galaxy	0h47m	-20°46'	9.2	21'x7'
146	The Silver Dollar Galaxy (NGC 253)	Sculptor	Spiral galaxy	0h48m	-25°17'	7.6	28'x7'
146	NGC 288	Sculptor	Globular cluster	0h53m	-26°35'	8.1	13.8'
147	The Pacman Nebula (NGC 281)	Cassiopeia	Emission nebula	0h53m	56°37'	7.8	30'x35'
148	M103 (NGC 581)	Cassiopeia	Open cluster	1h33m	60°39'	7.4	6'
149	NGC 654	Cassiopeia	Open cluster	1h44m	61°53'	6.5	5'

PAGE	OBJECT NAME	CONSTELLATION	TYPE	R.A.	DEC.	MAG.	SIZE
149	NGC 659	Cassiopeia	Open cluster	1h44m	60°40'	7.9	6'
149	NGC 663	Cassiopeia	Open cluster	1h46m	61°13'	7.1	16'
150-151	The Pinwheel Galaxy (M33)	Triangulum	Spiral galaxy	1h34m	30°40'	5.7	73'x45'
152	The Phantom Galaxy (M74)	Pisces	Spiral galaxy	1h37m	15°47'	9.4	10'
153	NGC 752	Andromeda	Open cluster	1h57m	37°48'	5.7	75'
154	The Double Cluster (NGC 869 & NGC 884)	Perseus	Open clusters	2h21m	57°08'	4.3/4.4	30' each
155	The Squid Galaxy (M77)	Cetus	Spiral galaxy	2h43m	-0°01'	8.9	7'x6'
156-157	The Heart Nebula (IC 1805)	Cassiopeia	Emission nebula	2h33m	61°28'	6.5	60'
156-157	The Soul Nebula (IC 1848)	Cassiopeia	Emission nebula	2h51m	60°25'	6.5	60'x30'
158	NGC 1097	Fornax	Spiral galaxy	2h46m	-30°16'	9.2	9.3'x6.3'

The Helix Nebula

One of fall's best sights lies in the southern part of the constellation Aquarius the Water-bearer. The easiest way to find the Helix Nebula (NGC 7293) is to start at Aquarius' Water Jar asterism just south of the constellation's border with Pegasus. Then scan 20° south of the asterism's eastern end to find magnitude 5.2 Upsilon (υ) Aquarii. The Helix lies 1.2° west of Upsilon. Or, you can locate Upsilon and the Helix 11° northwest of 1st-magnitude Fomalhaut.

The Helix is a beast of a planetary. It spans two-thirds the diameter of a Full Moon, making it one of the largest planetary nebulae. It appears big because it's about 10,000 years old and thus has had a lot of time to expand, and because it lies only 650 light-years from Earth.

NGC 7293 shows up easily in 8x42 or larger binoculars if the transparency is good and the Moon is not out. Because the nebula has a fairly low surface brightness, however, it's a little hard to locate if the transparency isn't top notch.

You will see a mostly uniform disk through an 80mm telescope, but its annularity appears noticeable on clear nights. As with most of the non-stellar objects in this book, the larger the telescope you use,

the better the view, at least until the field of view gets narrow enough in a large telescope that you can see only a part of the object at one time. Because the Helix is an emission nebula, either an OIII or UHC filter will boost the contrast and make it far more conspicuous.

I had the opportunity to view the Helix from a high-altitude observing site in the California Sierras on an exceptional night and got an astonishing view of some of the cometary knots in the nebula's interior. These thick balls of material occur when fast-moving gas in the expanding envelope catches up with slower-moving gas and create tail-like structures that point away from the central star.

The Helix Nebula

Also known as:

NGC 7293, Caldwell 63

Constellation: Aquarius the Water-bearer

Right ascension: 22h30m

Declination: -20°50'

Magnitude: 7.3

Apparent size: 20'

Distance: 650 light-years



The wonderful Helix Nebula (NGC 7293) ranks among the finest planetaries in the sky. This big and fairly faint object shows up in binoculars and small telescopes; an OIII filter will help you see it. NASA/NOAO/ESA/THE HUBBLE HELIX NEBULA TEAM/M. MEIXNER

(STSCI)/T.A. RECTOR (NRAO)



