

Binocular Universe: A Galactic Dynamic Duo

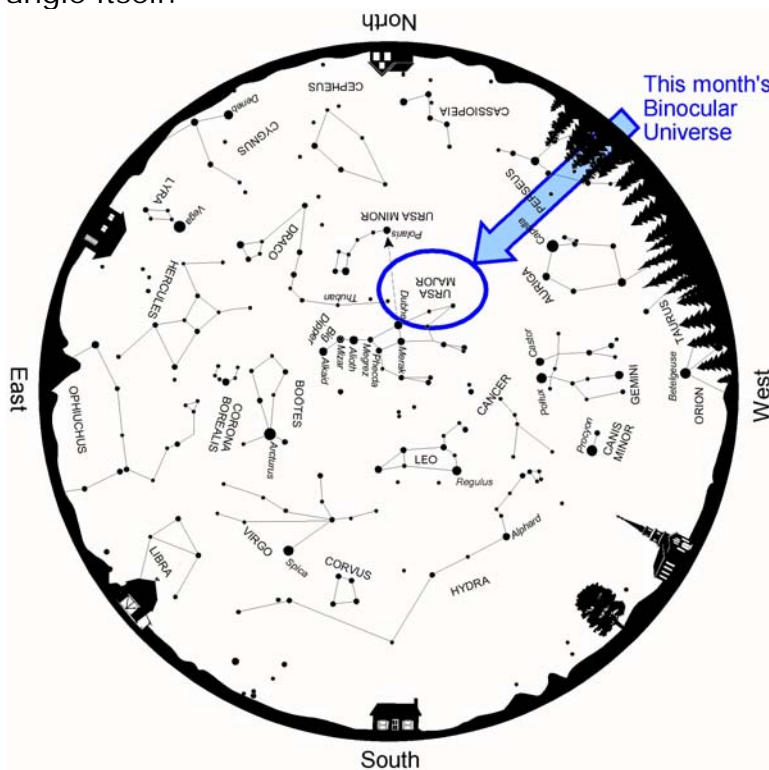
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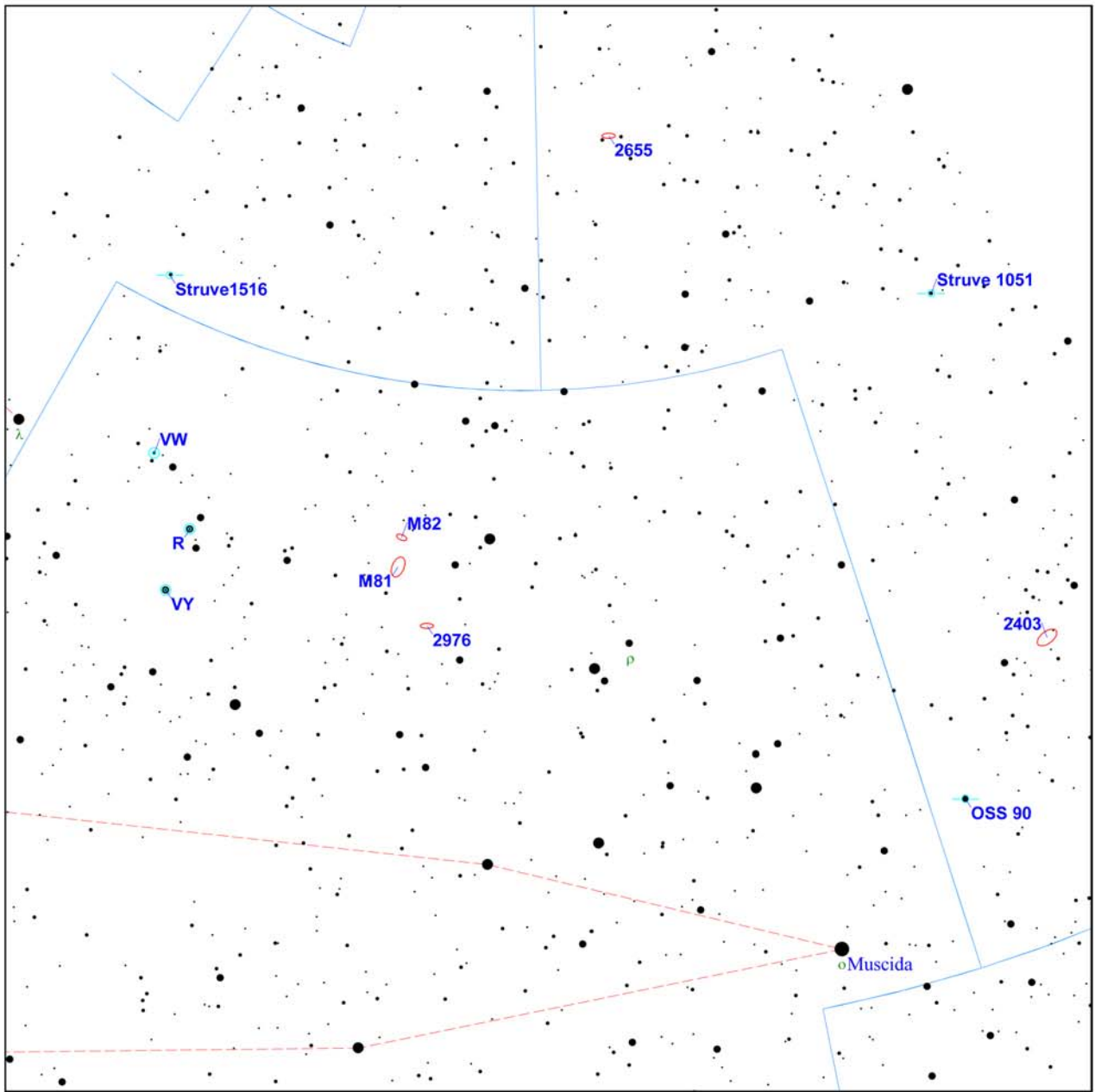


This month, we leave the confines of our galaxy and head into the depths of intergalactic space. More galaxies are scattered across the spring sky than in the summer, fall, and winter skies combined. While most of these galaxies are quite faint, a few are bright enough to be visible through handheld 50-mm binoculars. The galactic pair of M81 and M82 are two of those select few.

M81 and M82 lie at the end of a long line that extends from the Big Dipper bowl stars Phecda and Dubhe toward the northwest. Dubhe marks the line's midpoint, with the galaxies and Phecda set equally far away, but directly opposite one another. To find them through binoculars, hop (more correctly, leap) from Phecda to Dubhe, then on toward the northwest, to a loose arc of faint stars. Continuing toward the northwest, keep an eye out for a small right triangle of faint stars. M81 and M82 are just southeast of the star (24 Ursae Majoris) that marks the right angle itself.



Left: Spring star map, adapted from the author's book, [Star Watch](#).



Touring the Universe Through Binoculars Atlas
RA: 9h 20m, Dec: 69d 41m, FOV: 21d, Mag: 7.5

- ≤ 1.2
- 1.2 - 2.4
- 2.4 - 3.6
- 3.6 - 4.9
- 4.9 - 6.1
- 6.1 - 7.3
- > 7.3

- Galaxy
- Open Cluster
- ⊕ Globular Cluster
- Diffuse Nebula
- Planetary Nebula
- Variable Star
- Double Star

- ♿ Mercury
- ♀ Venus
- ♂ Mars
- ♃ Jupiter
- ♄ Saturn
- ♅ Uranus
- ♆ Neptune

- ♇ Pluto
- ☉ Sun
- ☾ Moon
- ♁ Asteroid
- ☄ Comet
- Unknown

Finder chart for this month's Binocular Universe from TUBA,
www.philharrington.net/tuba.htm

Of the two galaxies, **M81** is the brighter and more obvious. Its characteristic oval form can be distinguished through as small as 7x35 binoculars, although M81 will look like just a dim, fuzzy "star" in such a small aperture. Through 10x50 binoculars, its 7th-magnitude oval disk appears oriented northwest-southeast, measuring about twice as long as it does wide. Giant binoculars (10x70 and larger) improve the contrast between the galaxy's bright central nucleus and the dimmer surrounding halo of the spiral arms.

Nicknamed "Bode's Nebula" for its discoverer Johann Bode, who first spotted it in 1774, M81 is a classic example of an Sb spiral. Color photographs show a yellowish tint to its galactic core, which tells us that mostly older Population II stars lie there. The spiral arms appear bluish-white, the result of younger, hotter Population I stars.

Once you spot M81, look just half a degree to its northeast for **M82**. Located 12 million light years away, M81 and M82 form one of the most intriguing pairs of galaxies anywhere in the sky for stargazers. But be forewarned that since M82 is about 1.5 magnitudes fainter, it may take some looking for, especially in 50-mm and smaller binoculars. Look for a dim, elongated disk of grayish light, appearing almost like an ethereal cigar. The distinctive shape of M82 can be seen through 7x and larger binoculars as long as the night is dark and free from high levels of light pollution. Unlike M81, which shows a brighter core, M82 appears pretty much uniform in brightness from end to end.



M81 (center) and M82 (top) look so peaceful in this sketch made by the author through 10x50 binoculars.

North is up.

Also discovered by Bode in 1774, M82 is usually cataloged as an irregular galaxy, but recent observations suggest it was at one time a spiral. What happened to cause it to change?

Radio astronomers have known for years that M82 emits intense radio noise. Their studies of M81 and M82 reveal both galaxies are entwined in huge loops of matter swirling in and around the galaxies that is invisible in traditional photos.

More recently, long-exposure photographs at visible, infrared and x-ray wavelengths have uncovered a pair of huge nebulous plumes extending from a dark rift that cleaves through the galaxy's core. There, we find a tremendously active environment, where stars are being formed at a furious rate. It's been estimated that young stars in M82's starburst core are being churned out at a rate 10 times faster than they are inside our Milky Way. Supporting this, in 2005, the Hubble Space Telescope uncovered 197 young massive star clusters in the core.

What is causing all of this internal tumult in M82? One thought is that M82 survived a collision with M81 perhaps 200 million years ago. This resulted in a large amount of gas being funneled into M82's core, triggering the massive starburst activity that continues today. The gaseous filaments seen in radio images are the leftover debris of that ancient collision. Gravity of the more massive M81 has disrupted the spiral structure of M82, warping the galaxy and triggering massive internal strife. Both galaxies are locked in a fatal gravitational tug-of-war. Eventually, billions of years from now, only one massive galaxy will exist.

Adding intrigue to M82's life story was the discovery in April 2010 that something inside the galaxy started sending out unusual radio waves, the likes of which had never been found elsewhere in the universe. Theories abound as to what the source of these mystery waves might be, but so far, none fits the observed data. You'll find an interesting [article](#) about the phenomenon on the [New Scientist](#) magazine web site.

Two smaller galaxies have ringside seats watching the back-and-forth between M81 and M82. Readers with BIG binoculars might also want to try for **NGC 2976**. NGC 2976 lies about 1.5° to the south-southwest of M81. At 10th magnitude, it's a little on the faint side for 50-mm binoculars, but with just a little extra aperture, its dim presence might just reveal itself to patient observers.

The other spectator is **NGC 3077**, a 10th-magnitude galaxy 3/4° to the east-southeast of M81. You won't find NGC 3077 on the chart here, since it takes a rare pair of giant binoculars to pick out its very dim glow. But if you have 25x100 or larger binoculars, and are observing under the darkest conditions, why not give it a try?

Incidentally, neither of these NGC galaxies is sitting idly by as M81 and M82 do their thing. Both are also embroiled in the gravitational chaos besetting their sparring companions.

A fifth member of the M81 group, set a good distance away from the entangled foursome, is found along the far right (western) edge of this month's finder chart, across the border in Camelopardalis. Messier and his contemporaries never saw this spectacular spiral galaxy, even though it shines as brightly as M82. We know it today as **NGC 2403**, its entry in the New General Catalog.

Because it's out in the middle of nowhere, hunting down NGC 2403 can be tough. Here's how I do it. Start at M81 and move about one binocular field southwest, to the slender triangle formed by 5th-magnitude stars Rho, Sigma-1, and Sigma-2 Ursae Majoris. This distinctive triangle points toward the west-northwest, right at a lone 5th-magnitude star about a field away. From there, jog another binocular field southwest to a larger right triangle of three 6th-magnitude stars. Our target lies halfway between the triangle's right angle and its southern corner.

Recently I revisited NGC 2403 through my 10x50 binoculars. I could just make out its tiny, oval glow against the background sky from my backyard here on Long Island. Like M82, NGC 2403 can be a challenging binocular test, but now is the best time of year to give it a go in the evening sky, since it is cresting near our zenith.

While you're in the area, here are some other objects within this month's binocular universe:

Object	Con	Type	R.A.	Dec	Mag	Size/Sep/ Period	Notes
			(2000)				
Struve 1051	Cam	**	7 26.6	+73 5	7.1,7.8	31"	82° (1935);6028
2403	Cam	Gx	7 36.9	+65 36	8.4	17'x10'	*TUB page 100* Sc
OSS 90	Cam	**	8 2.5	+63 5	6.0,8.4	49"	82° (1924)
2655	Cam	Gx	8 55.6	+78 13	10.1	5'x4'	SBa
Struvel1516	Dra	**	11 15.4	+73 28	7.6,8.1	36.2"	102° (1940);8100
2976	UMa	Gx	9 47.3	+67 55	10.2	5'x3'	*TUB page 247* Scp
M81	UMa	Gx	9 55.6	+69 4	7.0	26'x14'	*TUB page 246-247* NGC 3031 Sb
M82	UMa	Gx	9 55.8	+69 41	8.4	11'x5'	*TUB page 246-247* NGC 3034 P
R	UMa	Vr	10 44.6	+68 47	6.7-13.4	301.68 days	Long Period Variable
VY	UMa	Vr	10 45.1	+67 25	5.9-6.5		Irregular
VW	UMa	Vr	10 59	+69 59	6.9-7.7	125 days	Semi-Regular

Have a question, a comment, or a suggestion for future columns? I'd love to hear it. Drop me a line at phil@philharrington.net.

Enjoy exploring galaxy country on these cool April evenings. And until next month, remember that two eyes are better than one.



About the Author:

Phil Harrington is a contributing editor to [Astronomy](#) magazine and author of 9 books on astronomy. Visit his web site at www.philharrington.net

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