

Messier Galaxies: Dim and Dimmer

Let's face it; galaxy hunting can be a daunting task. Many are dim, being slightly brighter than the background sky glow. They show little or no detail and their edges are not sharp. Often finding them is an accomplishment in itself.

Published magnitude values indicate the total brightness of an object as if it was concentrated in a single point. They do not represent how an object would appear when that light is spread across its area. A galaxy with a relatively bright magnitude can appear very dim if its light is smeared across a large area. What is needed is a value that combines the total brightness of a galaxy with its total area. That value is known as surface brightness.

There are two very large and seemingly very bright Messier galaxies which can be difficult targets to find. Their surface brightness values are the lowest among the 39 Messier galaxies. M33, even though its apparent size is larger than the full moon, is notorious for being difficult to detect. M101 is even worse. How to see these large dim objects, Messiers "Dim and Dimmer?"

Seeing Deeper

A. Stare better. Probably the most effective technique used in viewing large dim objects is averted vision. Simply cast your gaze about 15° from the faint galaxy. Keep your eye steady for at least 6 seconds to allow the light from the dim object to build in the same area of your eye. In this way, your eye can act as photographic film with its ability to integrate light over a period of time.

B. Boost the magnification. Another technique which helps distinguish faint objects from the background noise is increasing the magnification. Changing the magnification does not change the contrast between the galaxy and its background. The eye's sensitivity to dim objects is maximized when that object's apparent angular size is about 2° (or 120 minutes of arc). You want enough magnification to give an apparent diameter of 120 arc minutes.

Galaxies are not uniformly bright; their core, where most of the light originates, is generally 15-20% of its listed diameter. Therefore, if a galaxy is 10 minutes in diameter, most likely its bright core is only 2 minutes across. By increasing its magnification to 120x, the core will be more easily visible. If there are any bright knots present in the galaxy's outer regions, an increase in magnification will help to bring them out too. In these cases, a magnification of more than 200x may be needed.

c. Tap the tube. At low light levels, the eye responds better to moving than to static objects. If a galaxy is at or just below detection, gently tap the telescope tube. The small vibration may stimulate the eye into perceiving what was once invisible.

d. Clean optics. Dirty lenses will scatter light and give a brighter background. The contrast between the target object and its surrounding sky glow will be less, making the object more difficult to discern.

e. Be rested. If you are tired, you won't be as visually receptive to dim objects. Go to bed and try on another night.

f. Breathe deeply. Oxygenating your eyes will increase their visual sensitivity for dim light. Don't hyperventilate, though. A couple of deep breaths should enhance your night vision.

g. Eliminate all stray light. If there is any extraneous light making its way into your telescope tube, it will brighten the background and reduce contrast. Use a tube extending shield, especially if you have an SCT.

Messier Galaxy Chart

Galaxy	Size (min.)	Surface Area (min ²)	Integrated Magnitude	Surface Brightness (mag./min. ²)
M31	192 x 60	11520	3.4	13.3
M32	7.6 x 5.8	44	8.2	12.0
M33	70 x 41	2870	5.7	14.1
M49	8.9 x 7.4	66	8.4	12.7
M51	11 x 7.8	86	8.4	13.0
M58	5.4 x 4.4	24	9.8	13.0
M59	5.1 x 3.4	17	9.8	12.6
M60	7.2 x 6.2	45	10.7	12.7
M61	6.0 x 5.5	33	9.7	13.2
M63	12.3 x 7.6	94	8.6	13.3
M64	9.3 x 5.4	50	8.5	12.5
M65	10 x 3.3	33	9.3	12.8
M66	8.7 x 4.4	38	9	12.7
M74	10.2 x 9.5	97	9.2	13.9
M77	6.9 x 5.9	41	8.8	12.6
M81	25.7 x 14.1	362	6.9	13.0
M82	11.2 x 4.6	52	8.4	12.4
M83	11.2 x 10.2	114	7.6	12.5
M84	5.0 x 4.4	22	9.3	12.4
M85	7.1 x 5.2	37	9.2	12.9
M86	7.4 x 5.5	41	9.2	13.0
M87	7.2 x 6.8	49	8.6	12.6
M88	6.9 x 3.9	27	9.5	12.8
M89	5.0 x 4.6	23	9.8	12.9
M90	9.5 x 4.7	45	9.5	13.4
M91	5.4 x 4.4	24	10.2	13.4
M94	11.0 x 9.1	100	8.2	12.9
M95	7.4 x 5.1	38	9.7	13.4
M96	7.1 x 5.1	36	9.2	12.8
M98	9.5 x 3.2	30	10.1	13.5
M99	5.4 x 4.8	26	9.8	13.1
M100	6.9 x 6.2	43	9.4	13.2
M101	27 x 26	702	7.7	14.6
M104	8.9 x 4.1	36	8.3	11.9
M105	4.5 x 4	18	9.3	12.2
M106	18 x 8	144	8.3	13.4
M108	8.3 x 2.5	21	10	13.0
M109	7.6 x 4.9	37	9.8	13.5
M110	17 x 10	170	8	13.3