The Winter Sky

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Fixed Stars

As the Milky Way disappears into the evening twilight during the late winter months, one of the last parts we see is the Orion region. No doubt the most exciting object in this region is the Orion Nebula, Messier 42, which we discussed a year ago. This is just the central part of a large region of star formation, which is of particular interest to the astronomers at MIRA. However, those of us who look farther afield need not despair, because just as Orion is disappearing in the southwest, an even larger region of star formation comes into view in the northeast, in the form of the very active galaxy, Messier 82.

If you can find M81 (following the instructions in our spring 2000 column), then you can find M82 as well, because it lies just 0.6 degrees almost due north of M81. It is an irregular galaxy, much smaller and fainter than M81, but still easily visible with a small telescope. It is the second member of small group of galaxies associated with M81. The third member of the group is also an irregular galaxy, NGC3077, about the same distance east and a bit south of M81. In addition, there are several very faint and diffuse dwarf galaxies in the neighborhood.

M82
(N.A. Sharp/NOAO/AURA/NSF)

Messier 81 is a very normal looking spiral galaxy, with narrow, well defined arms and a symmetrical appearance (which, as it turns out, is rather deceiving). It has been much observed by radio astronomers, with the aim of testing dynamical theories. A great annoyance is the presence of M82 nearby, because it is a strong and complex radio source, and its diffraction pattern overlaps the image of M81 and seriously degrades the observations. Many hours have been spent trying to remove this nuisance.

But M82 is itself well worth the careful study that has recently been devoted to it. Optically it is not very prominent, appearing as a very dusty irregular galaxy seen edge on, so that the bright parts of the galaxy are largely obscured. Most other forms of radiation, such as radio, infrared and x-ray, are not much disturbed by dust, and reach the observer in great quantity, so that the galaxy is really much brighter than its optical appearance suggests. The x-ray radiation in particular, with its distribution over many discrete sources, suggests that much of the activity must be in the form of supernovae. These result from the formation and rapid evolution of very massive stars in an environment rich in dust and gas. The x-ray and radio radiation come directly from these supernovae and their interaction with the immediate surroundings. The infrared radiation comes largely from dust heated by the supernovae and other massive stars, which have not yet reached supernova stage. This heated dust must fill much of the inner part of the galaxy.

Because of the strong dust extinction, most of the light that we see from M82 comes from the outer part of the galaxy. However, we do see some of the light from the central part indirectly. We observe streamers extending

outward from the galaxy, perpendicular to the plane. We think that these are streams of dust, blown out of this region by the generation of so much energy there. These streams are illuminated by these same stars and are visible to us only after they reached a height well above the plane of the galaxy. Messier 82 would certainly appear much brighter if it were seen pole on.

Messier 82 is the nearest of a growing number of what we have come to call starburst galaxies. The existence of such objects tends to confirm our picture of the evolution of large galaxies. These may begin as smaller objects, possibly formed in groups because of the way in which the material of the early universe condenses. These objects occasionally collide with one another and coalesce into larger objects, a process which astronomers picturesquely refer to as "cannibalism." Since the small objects usually are rich in dust and gas, this process will increase the gas content of the larger object, leading to a sudden increase in star formation rate. It is interesting to see this taking place so close by. Perhaps NGC3077 will be next.

Planets

Mercury will be visible during the latter part of January in the southeast morning sky, but a much more favorable apparition occurs toward the end of March, when it will be relatively high in the western sky after sunset. Mercury will not be alone at that time, because for a period of about two weeks all five naked eye planets will be visible in the evening sky.

Venus continues to be visible low in the southwestern evening sky. As the quarter progresses, it will move northward and away from the Sun, reaching greatest elongation on March 29 and creating a favorable observing opportunity.

Mars will continue to be well observable in the evening sky as it moves from Pisces into Taurus during the quarter. As if to make up for last fall, Mars will not be in opposition again until early next year. There will be two lunar occultations of Mars during the quarter, neither one visible from our part of the world.

Jupiter rises in the early evening at the beginning of the quarter and is stationary on January 4. It reaches opposition on March 4 and can be seen during the whole night for the rest of the quarter.

Saturn passes opposition just as the quarter begins, and, being a slow mover, remains in Gemini for several months. It is stationary on March 7. It will remain visible until after midnight during the whole quarter.

Meteor Showers

The only spectacular meteor shower in the winter quarter is the Quadrantids, which peaks on the night of January 3 and has a very short duration. Unfortunately this is only three days before full moon, so that moonlight will spoil the show this year. Two weak showers may be of interest to some observers. These are the delta Cancrids and the delta Leonids. The former peaks on January 17 and might be observed during the first three weeks of the new year, while the latter peaks on February 25 and is active between February 15 and March 10. These are both very sparse showers of faint meteors, best suited for telescopic observation. They are easily confused with the very diffuse Virginids, which may be observed at any time during the quarter.

Comets

A new comet, C/2003 T3 (Tabur) was discovered on October 14, and it is refreshing to have a new comet which does not bear the name "LINEAR." At discovery it was twelfth magnitude, and it may reach eighth magnitude by March. However, it will then be too close to the Sun for observation. Later in the year it will start fading, but it should then become observable in the northern sky.

Comet LINEAR (2002 T7) continues to brighten and it should be visible as a ninth magnitude object in the western evening sky in January and February, after which it gets too close to the Sun for observation.

Among the periodic comets, 2P/Encke is brightening rapidly and should now be well visible with binoculars as a diffuse object of seventh magnitude. Two more recently discovered comets are worthy of mention. 88P/Howell, whose orbit was changed significantly by a passage near Jupiter in 1978, can be seen as a tenth magnitude object during March, after passing solar conjunction, and 78P/Gehrels will be very favorably placed for observation later in the year.

Eclipses

The winter quarter this year falls outside of the eclipse season, and in fact the only eclipse that will be visible in 2004 from our region is a total lunar eclipse in October.