The Fall Sky
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Fixed Stars

When we look at the Milky Way, which is in full view during the fall, we cannot fail to notice the Cygnus Rift, a dark band that divides the bright Milky Way into two parallel parts. This band extends from Cygnus all the way down to Aquila and beyond. For us, this is a perfectly obvious example of interstellar extinction. We understand it as a nearby band of interstellar dust, which blocks the light from the more distant stars making up the bright Milky Way. It is therefore remarkable that it took astronomers so long to recognize interstellar dust as an important component of the Galaxy, and subsequently of all spiral galaxies.

Although the presence of discrete dust clouds had already been suspected by William Herschel and many of his successors, it was only in 1930 that R.J. Trumpler demonstrated that dust was to be found throughout interstellar space. He did this in an interesting way. He realized that the apparent density of stars in a star cluster, or, if you prefer, the surface brightness, the cluster. The total brightness will change, but so will the apparent area, changed. Looking at clusters of found that the smaller the appearance. He could best explain this if full of some absorbing material, like

We can speculate on why it took so long to make this very fundamental discovery. Perhaps this is a case of astronomical wishful thinking. In the early twentieth century, models of the Galaxy, which at the time was essentially the whole known universe, were based largely on star counts. The “Kapteyn universe”, of an irregular disk of stars whose one of these. As we now know, this suffering from extinction, so that more thinly distributed than they re-extinction meant that the method less, at least as it had been applied one of their most powerful tools known universe. No wonder they

Interstellar matter can be observed in many ways, but it is the extinction that is most widely noted and most troublesome to astronomers. There are three main aspects of extinction. The first, and most important, is the dimming of light from a star due to the intervening dust. Clearly, the dust will absorb or scatter a certain amount of the starlight, so that the star will not appear as bright as it otherwise would. This is an unwelcome complication when one wants to determine the absolute brightness of a star at known distance or the distance to a star of known or assumed absolute brightness.

Second, the extinction depends on the wavelength of the light. The longer the wavelength compared to the particle size, the less the extinction, as long as the particles are not too large. Thus red light passes more easily than blue, and a star suffering from extinction appears reddened. We can usually estimate the reddening by comparing the apparent color of the star to the color that it should have according to its spectrum. Although the relation between reddening and extinction is not the same in all regions of space, probably because of differing
composition of the dust, a standard reddening law will suffice for most purposes. Thus, annoying as the extinc-
tion sometimes is, without the reddening astronomers would be even worse off than they already are.

A third effect is the polarization of light. This is usually a very small effect, and quite hard to measure, but it
can give us additional information about the interstellar medium. Dust particles are generally not round but are
longer in one dimension that in the others. They also spin or tumble in space because, among other things, of
collisions with other particles. If there is a magnetic field present, as there almost always is, they will tumble with
their spin axis aligned with the magnetic field. This aligns the particles themselves perpendicular to the field, and
this is the direction of polarization in which the most light is absorbed. Thus the light left unabsorbed is generally
polarized in the direction of the magnetic field. As you can well imagine, there were many conflicting theories
presented before the astronomers got this straightened out, around the middle of the twentieth century. We can
now map the magnetic field in the nearby parts of the Galaxy, and we find that it is generally aligned with the
spiral arms, as we would expect from dynamical arguments.

Planets

Mercury will be visible with great difficulty low in the southwest evening sky in the middle of November
and again low in the southeast morning sky toward the end of December. This is not the time to be observing
Mercury.

Venus will remain in the eastern morning sky during the whole quarter, but the best observing will be in
October. By December it will rise only two hours before the Sun and will be observable only during twilight.

Mars will become visible low in the eastern morning sky at the end of October, and its visibility will increase
very gradually during the rest of the year.

Jupiter will also become visible in the eastern morning sky during October and its visibility will also improve
as the year nears its end. On November 9 Jupiter will be occulted by the Moon, the first of 11 such occultations
during this and next year. This is the first of four lunar occultations of planets that will occur during November.
None of them will be visible from our region.

Saturn starts the quarter high in the morning sky and will become increasingly well placed for observation as
the quarter progresses.

Meteor Showers

Two important meteor showers will dominate the fall observing season. The Orionids, which peak on
October 21 form a complex shower which may be observed during the whole month of October. The Geminids,
one of the most intense showers of the whole year, will peak on December 13 and should be observable for a few
days on either side of this date. Both showers enjoy an almost moonless sky and are visible during the whole
night.

The Leonids, whose dramatic return during the last few years has attracted so much attention, are now well
past their peak, and only modest activity is anticipated. They should be at maximum on November 17 and are
best observed after midnight, when the radiant has risen and the Moon set.

Among the lesser known showers, we should note the Draconids, on October 8, which are known to pro-
duce occasional unexpected outbursts. Two other weak showers which, nevertheless, sometimes show strong
outbursts are the Alpha-Monocerotids on November 21 and the Phoenicids on December 6, the latter mainly
visible from the southern hemisphere.

Comets

The brightest of a considerable number of periodic comets currently visible is 78P/Gehrels. It should reach
perihelion and opposition almost simultaneously (very unusual for a comet) in October when it is expected to
reach tenth magnitude.

Comet 2002 T7 (LINEAR) has been one of the brightest comet of the year, thus far, but it has been mainly
visible from the southern hemisphere. It may, however reappear for northern observers as a thirteenth magnitude object around the end of October.

Another bright comet is 2001 Q4 (NEAT) which is now well past maximum but should remain visible as a telescopic object for the rest of the year.

Comet 2003 T4 (LINEAR) is brightening slowly and should reach eleventh magnitude by the end of the year, but it is located below the pole and fairly close to the horizon, so it is not a convenient object for observation.

**Eclipses**

There will be two eclipses in October. The first is a partial solar eclipse on October 14, visible from the far northern Pacific Ocean and surrounding regions, but not from our area.

Of more interest to us is a total lunar eclipse on the evening of October 27. The eclipse will begin slightly before moonrise, but we should be able to see most of it. The circumstances are similar to those of the eclipse of November 8, 2003, but a little more favorable, in that it will occur about 80 minutes later, giving us that much more time to admire it.