Until the turn of the century, the only times when the inner solar atmosphere could be observed were the fleeting moments of totality during eclipses of the Sun, when the whole of the solar corona and the prominences on the Sun’s limb are viewable. Since the advent of the spectrohelioscope and sub-Ångström filters, each observation can now become a total eclipse of its own.

The most common viewing frequency for amateur astronomers is at 656.3 nm, the hydrogen-alpha line, although filters are available to allow the Sun to be viewed in hydrogen-beta at 486 nm, or in other lights such as calcium.

The view of the Sun with a 4-Ångström bandwidth filter will show limb prominences, but it requires far more expensive filters of shorter frequency to view solar surface activity.

The use of a sub-Ångström (bandwidth) filter, although very rewarding, is not something that can be accomplished immediately. The delicacy of the instrumentation means that a considerable period has to be spent in actually learning how to observe. Most of the filters on the market allow their fine tuning to be carried out by slightly tilting the filter, and therefore a very delicate touch is necessary to obtain the best possible view.

The H-alpha line is not at a single frequency, but has a bandwidth that can be scanned, and certain objects show up better in some parts of the band than others. Scanning from the ‘red wing’ to the ‘blue wing’ will show a marked difference, as the rotation of the Sun will give a shift in the line. Prominences tend to show up better just before the peak of the H-alpha line, while
surface features, filaments and granulation tend to be slightly better after and during the sweep of the peak across the filter.

The filters work on a polarising series of elements, and therefore ‘seeing’ can be improved by rotating the filter through 90° to find the best possible observation point.

Such filters are heat sensitive and will slightly change frequency when warmed by heat from the solar image. Also the optical configuration itself can change focus, and therefore sub-Ångström viewing is a matter of continual readjustment to obtain the best view for the phenomenon under observation.

Observing Solar Activity

Every time you observe the Sun there is bound to be some prominence activity on the limb that can be recorded. The prominences can be of several varied forms. The longest-lasting prominence type is the ‘hedgerow’, which seems to hang in the solar atmosphere without appreciable change for a considerable length of time and can be seen over periods of up to several rotations. These prominences are mainly diffuse and delicate in structure, and appear dark red in colour, superimposed on the black background of the sky. When any prominence is viewed against the solar disc it is termed a filament and a very rewarding observation is to watch, over a period of several days, a ‘hedgerow’ prominence rotate on to or off the disc. Sometimes, if these prominences are cross-lateral, they can be viewed as part-prominence and part-filament, which gives a wonderful three-dimensional effect.

It is very difficult to interpret exactly what is being viewed at the edge of the disc, as prominences could originate on or behind the limb, or a mixture of both. ‘Hedgerow’ prominences are often seen as a series of arcs showing the magnetic structure of the Sun in the lower corona. When these loop-type bridges are foreshortened, it can be difficult to interpret exactly what it is you are looking at.

Some prominences, known as spray prominences, are combined with highly active areas and will spray material at a velocity of up to 2000 km/sec. This exceeds