

Glossary of Major Hydrogen Alpha Terms

ACTIVE FILAMENT SYSTEM (AFS): A system of small, arched linear-absorption H-alpha features connecting bright, compact plage of opposite polarity. An AFS is a sign of emerging bipolar magnetic flux and possibly rapid or continued growth in an active region.

ACTIVE PROMINENCE: A prominence above the solar limb moving and changing in appearance over a few minutes of time.

ACTIVE REGION: A localized, transient volume of the solar atmosphere in which plages, sunspots, faculae, flares, etc., may be observed. Active regions are the result of enhanced magnetic fields; they are bipolar and may be complex if the region contains two or more bipolar groups.

CHROMOSPHERE: The layer of the solar atmosphere above the photosphere and beneath the transition region and the corona. The chromosphere is the source of the strongest lines in the solar spectrum, including the Balmer alpha line of hydrogen and the H and K lines of calcium, and is the source of the red color often seen around the rim of the moon at total solar eclipses.

CHROMOSPHERIC NETWORK: An ever-present patchy network of long thin sinuous chains of tiny low contrast brighter points called Filigree (also found in plages) extending over much of the solar disk in H-alpha. These points, or network elements, often have darker spicules or short fibrils sticking out of, or running over them (part of the fine disk detail known as the Dark Mottles), making the actual network harder to see.

CORONAL MASS EJECTION (CME): Huge bubbles of gas threaded with magnetic field lines that are ejected from the Sun over the course of several hours. They disrupt the flow of the solar wind and produce disturbances that strike the Earth with sometimes catastrophic results. CME's are often associated with solar flares and prominence eruptions but they can also occur in the absence of either of these processes.

DISAPPEARING SOLAR FILAMENT (DSF): A solar filament that disappears suddenly on a timescale of minutes to hours. The prominence material is often seen to ascend but can fall into the Sun or just fade. DSFs are probable indicators of coronal mass ejections.

ELLERMAN BOMBS: Tiny fairly bright transient points of light (usually last less than 5 minutes), most often found in Emerging Flux Regions or on the edges of sunspots where the magnetic field is breaking the surface. They are best seen in the wings of H-alpha (nearly 5 Angstroms wide).

EMERGING FLUX REGION (EFR's): An area of the sun where a magnetic dipole, or "flux tube" is surfacing on the disk, eventually producing a bipolar sunspot group. In H-alpha, EFRs usually appear as a small oval area of bright plage (typically about 7000 km across) often containing a series of short-lived narrow fibrils (Arch Filament System(AFS)) running roughly from one end of the dipole to the other. Each pole of an

EFR is often marked by pores or small developing sunspots. Surges or even small solar flares can sometimes occur in EFRs.

FIBRILS: Small fine filament-like darker features which tend to run along magnetic field lines. Often, they are connected to or part of the structure of larger filaments, curving into or running along the filament's main axis.

FIELD TRANSITION ARCHES (FTA): Filament-like fibrils which cross the polarity inversion line (a line marking the halfway point between two opposite polarity areas) of a bipolar magnetic region. Unlike AFS fibrils, they show little or no Doppler shifts and tend to be rather thin and not very dark. FTA tend to arch directly between localized areas of opposite magnetic polarity, and often mark magnetically stable regions.

FILAMENTS: Prominences seen against the face of the sun, appearing as long narrow dark streamers or diffuse complex dark areas in H-alpha light. Filaments often mark areas of magnetic shearing (see Prominences).

HYDER FLARE: A filament-associated two-ribbon flare, often occurring in spotless regions. The flare is generally slow (30-60 minutes rise time in Ha and x-ray) and follows the disappearance of a previously quiescent filament.

MORETON WAVE: A chromospheric shock wave that is sometimes seen expanding outward from large impulsive solar flares, moving over the surface at about 1000 km/sec. It usually appears as a slowly moving diffuse arc of brightening in the centerline of H-alpha, or as a faint diffuse slightly darker arc in the blue wing.

PLAGE: Patchy H-alpha brightenings on the solar disk, usually found in or near active regions, which can last for several days. Plage is irregular in shape and variable in brightness, marking areas of nearly vertical emerging or reconnecting magnetic field lines (from French word for "beach" with the "a" being a short one).

POLAR CROWN: A nearly continuous ring of filaments occasionally encircling either polar region of the Sun (latitudes higher than 50°).

PORES: Tiny darker spots under 2500 km in size, often having fairly short lifetimes. Pores occasionally form where several granulation channels meet and can sometimes precede the development of sunspots.

PROMINENCES: H-alpha emission features projecting beyond the limb of the sun, consisting of complex clouds or streamers of gas above or in the chromosphere. They generally come in two broad classes: Active (limb flares, surges, sprays, loops), and Quiescent (Quiet Region Filaments, Active Region Filaments).

QUIESCENT PROMINENCE: A long, sheet-like prominence nearly vertical to the solar surface. Except in an occasional activated phase, shows little large-scale motion, develops very slowly, and has a lifetime of several solar rotations. Quiescent prominences form within the remnants of decayed active regions, in quiet areas of the Sun between active regions, or at high solar latitudes where active regions seldom form.

RECONNECTION: A realignment of magnetic fields, where an area of one magnetic polarity breaks earlier links, and connects with the nearest region of opposite polarity. On the sun, this often happens when a new magnetic dipole emerges near another pre-existing one. For example, if the north pole of the new dipole emerges close to the south pole of the old dipole, the lines of force may reconnect these two nearby poles configuring them as a new lower energy dipole and releasing energy, often in the form of plage brightening or a solar flare.

ROTATION: This is the Carrington Rotation Number for the date of the observation. This can be found in any good astronomical almanac or in the ALPOSS ephemeris at: <http://www.lpl.arizona.edu/~rhill/alpo/solstuff/ephems/solephem.html>

SOLAR FLARE: Extremely bright moderate to large transient emission feature lasting from a few minutes to over four hours. Flares are a rapid and violent release of energy in the chromosphere due to extreme magnetic field stress and can occasionally result in material leaving the sun in the form of a Coronal Mass Ejection(CME).

SPICULES: Small jets of gas under 10,000 km long, usually seen as a mass of tiny brighter spike-like features at the limb or as tiny darker spikes coming out of network elements, but are not usually seen over bright plage.

SPRAY: A transient prominence formed by the explosion of pre-flare elevated material which sends debris flying off in many directions. Usually produced only by the most violent flares, as overlying filaments are blown away.

SUNSPOT: Dark long-lived photospheric feature, typically from 2500 to 50,000 km in size. Moderate to large spots usually consist of a darker central region (umbra) and a lighter halo consisting of many short fine fibrils (penumbra). Sunspots have strong concentrated magnetic fields which tend to inhibit energy transfer from below, making them at the center about 2500 degrees K cooler than the photosphere. In the Umbra, the fields tend to be nearly vertical in orientation while in the penumbra, the magnetic fields become more horizontal. Sunspots are visible in H-alpha, but their penumbrae are lower in contrast than in white light.

SURGE: A transient prominence produced by flares or very active regions, appearing as a moderate to large collimated jet of gas rising up from the surface. Surge ejected gas will often fall or draw back onto the sun tending to follow magnetic field lines, while at other times it will rise and disperse, fading from view.

"WINGS" OF H-ALPHA: Wavelengths slightly off of 6562.8 Angstroms (up to +/-2 Angstroms), used for viewing Doppler-shifted features. The "blue" wing is a shorter wavelength and the "red" is on the longer side.

**Glossary compiled by David Knisely*