June Gilchrist introduced this evening’s guest speaker, Ruhee Kahar a PhD student from Dundee University talking about “Young Stars”.

Ruhee specified the mass range she is researching which is intermediate in the range greater than one solar mass but less than eight solar masses. By studying this particular range and age she hopes to improve the knowledge of stellar evolution. Stars less than eight solar mass generally evolve to red giants then planetary nebulae with a white dwarf remnant, while stars greater than eight solar masses evolve to super giants then explode as supernovae. The formation of stars is a process where clouds of gas and dust clumps together followed by further mergers of clumps then when conditions allow depending on cloud density and temperature gravitational collapse will occur leading to a protostar. Generally, as fusion progresses the star follows a life cycle determined by its initial mass.

The Orion Nebula is the closest star forming region to Earth and contains many hot young stars within. It is possible to study protostars by infrared detection, their luminosity is low because they are not hot enough for fusion to take place. An example was shown of a protostar LRCC 54361 found within IC 438 in Perseus. This is a binary protostar which may only be hundreds of thousands of years old. Pre-Main Sequence stars of T-Tauri type are optically visible despite being surrounded by a circumstellar disk. They release large amounts of light due to gravitational collapse before fusion begins. They are variable stars and a T – Tauri star is responsible for Hind’s variable nebula. These have been observed by the Hubble space telescope and by the ALMA sub-millimeter telescope in the Atacama Desert Northern Chile. Lots of rings and gaps in the disk have been observed indicating planets carving out their orbits. Proto planetary disks have been observed with various orientations, pole on, oblique or edge on views. Accretion mechanisms affect the evolution of planets around the central star. With young stars accretion is magnetically driven and this can be stable or unstable.

Star temperatures can be inferred from spectra of the bright emission lines or dark absorption lines seen in the continuum and these measurements are used to classify stars. The width of an emission line can tell us how fast the star is moving. These changes can be observed in real time and an example was given of RY Tauri H alpha spectrum and how this may indicate accretion disk behavior.

The variability of young stars can be observed in time ranges less than a day to a few years. An image of NGC 2264 star forming region was shown which includes the Christmas Tree star cluster comprising 600 members mainly new stars and the Cone nebula. The nebula is absorbing extreme UV and will eventually be eroded. Associated with NGC 2264 is the Snowflake Cluster where the very young infant stars appear pink and the Fox Fur nebula where gas and dust illuminated by young stars strongly emitting UV cause H alpha emission.

A video made using historical photographic plates of R Monocerotis 1917 to 1919 showed the variability of this binary star system. There is a two-day variability due to the star itself and a two-year variability due to the accretion disk. UX Orionis was discovered by Henrieta Leavitt and is an irregular variable star with an inclined stellar disk with episodes of obscurity. The luminosity changes are thought to be caused dust clouds obscuring our view. These may be infalling from the disk onto the star. Ruhee explained that her research was focused on twenty-five young stellar objects. There is great variation in the inclination of disks but this is assumed to be a function of our viewpoint on Earth. The magnetic field in these young stellar objects extend well out to space in contrast to the constrained field of our own Sun. The iron, lithium, Sulphur and oxygen ions are affected by these magnetic fields. The young low mass stars have extended magnetic fields while intermediate mass stars have magnetic fields which are confined.

June then thanked Ruhee on behalf of the society for her excellent talk on intermediate mass young stars.

Following the tea break Brian Kelly presented sky notes and the key things to look out for in March are Mercury greatest elongation on 24th so best observing opportunity and a Jupiter Uranus conjunction where they are only separated by 3.5 degrees on 31st March.

Brian showed an image he had taken of large sunspot groups and advised a CME is on its way. He also pointed out it would be worth observing this group in Hydrogen alpha as there are flares ongoing with this group. At the moment the waxing Moon is high in the sky so well worth observing. Also worth reviewing Ken’s lunar notes which are part of the published sky notes which Brian sends out.

The meeting closed at 2130.