APPLICATIONS OF STUDYING STELLAR JETS

Photometric and Spectrometric applications of Stellar Jets

AGE OF YSOS

We can calculate its dynamic age by the time since the outflow was first ejected from the protostar. The spectral lines of the emitted light from HH objects show Doppler shifts (changes in wavelength) caused by the movement of the outflowing gas. By analyzing these shifts, astronomers can determine the radial velocity (speed along the line of sight) of the gas ejected by the young star.

MODELLING DUST CLOUD

Estimating and modeling the surrounding dust cloud (using the column density method) of a Young Stellar Object (YSO) involves analyzing the interaction between the fast-moving outflow and the dense circumstellar envelope. The outflow carves a cavity into the envelope, and the properties of this cavity can be used to infer the properties of the dust cloud.

CHEMICAL COMPOSITION

The outflows drive shocks that compress, heat, and alter the chemical composition of the interstellar medium (ISM). Molecular spectroscopy, particularly in the millimeter and sub millimeter wavelengths, is used to identify a vast array of molecules within these shocked regions, which reveals how the chemistry of interstellar clouds is modified during star formation.

YSO SURVEYS

Photometric surveys in narrowband filters centered on H-alpha emission are effective at identifying young stellar objects (YSOs) with active accretion and outflows, even in crowded star-forming regions. This technique helps to build complete inventories of the young star population in a given region.