

**Probing the magnetic field structure  
in star-forming regions through molecular line polarization**

Supervisor: LAI Shih-Ping (賴詩萍教授)

The major problem of the most commonly used method for probing magnetic fields, the dust polarization observation, is that it is incapable of differentiating the field structure along the line of sight. Since every molecular transition has a particular critical density, measuring the molecular line polarizations, the Goldreich-Kylafis effect (GK effect), provides a unique way to probe the three-dimensional structure in star-forming cores. Although currently it is very difficult to measure GK effect, the Atacama Large Millimeter/submillimeter Array (ALMA) will potentially enable routine observations of GK effect. We have developed a computer program for modeling molecular polarization with uniform magnetic field and velocity gradient. Students will be asked to process molecular line polarization data of protostellar outflows taken with Submillimeter Array (SMA) and compare the data to our models in order to derive some physical parameters of the outflows.