Investigation of solar flares via multi-wavelength observations and theory

Solar flare is the most energetic explosion in solar system. The energetic particles can be accelerated to MeV and even GeV energies by the reconnection electric field produced via magnetic reconnection process in the solar corona. The energetic particles can emit X-rays by bremsstrahlung and millimeter or submillimeter emissions by gyrosynchrotron radiation during flares. Since our Sun is much closer to the Earth than other astronomical objects in the universe, it is much easier to achieve solar observations by deploying multiple wavelengths with high cadence and high spatial resolution. Solar flare thus provides a good opportunity to study physical processes in nature, such as particle acceleration and energy release, that would be similar in other astronomical phenomena such as stellar flares or accretion disks. We have much experience in observational data analyses (such as Hα, white-light, EUV/UV, X-ray, and magnetogram) and theoretical modeling for studying solar flares. Students in the summer program can learn the flare-related magnetic reconnection and particle acceleration theories, as well as the data analyses of solar multi-wavelength observations.