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TIME: Thursday, 2:30 PM, August 01, 2013 LOCATION: A601 NAOC

Herschel SPIRE Spectroscopy of Luminous IR Galaxies

Dr. Nanyao Lu 吕南姚 (Caltech)

Dr. Nanyao Lu obtained his Ph.D. in Astronomy from Cornell University in 1993. Afterwards, he joined the Infrared Astrophysical Group at Jet Propulsion Laboratory as a postdoctoral fellow, and went on to become a staff astronomer at the Infrared Processing and Analysis Center located on Caltech campus, with which he is currently associated with. He has extensive technical experience in the area of space infrared astronomy, acquired over time from his associations with various instrument and/or science teams for ISO, Spitzer Space Telescope and Herschel Space Observatory. His early research activities range from HI 21 cm, optical and IRAS observations of normal galaxies, to galaxy large-scale distribution and Hubble constant measurement, to observations of distant radio galaxies. Over the last decade, his research has been focusing more on studies of interstellar dust and gas, star formation and their interplay in normal and IR luminous galaxies.

Abstract

We describe a Herschel/SPIRE 194-671 micron spectroscopic survey of a flux-limited sample of 125 local luminous infrared galaxies (LIRGs). The survey generated rich data on molecular line emission, including detections in almost every target of (i) the CO rotational line emission from warm and dense molecular gas, (ii) the [NII] 205 um line from ionized gas, and (iii) the [CI] 370 and/or 609 um lines arising mainly from less dense molecular gas where low-J CO lines arise. We present our observational results and statistical correlations among CO line luminosities, IR dust luminosity and color, and whether a target is known to harbor an AGN or not. We show that a decreasing [NII] 205 um to a mid-J CO line ratio traces galaxies of increasingly denser gas and/or more intense UV radiation field. Our CO data show (a) that for most LIRGS, there is a remarkable proportionality between molecular gas heating and total dust heating, suggesting a star formation-dominated case where CO line emission occurs primarily at mid J levels (i.e., $4 < J < 10$), and (b) that an AGN heats CO gas to emit lines primarily at higher J levels. As a result, the mid-J CO line emission can serve as a robust tool to separate starburst-dominated from AGN-dominated galaxies, and to observationally quantify the fractional luminosity of the dust emission that is due to AGN heating.

All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.

You are welcome to nominate speakers to Weimin Yuan (wmy@nao.cas.cn), Mei Zhang (zhangmei@bao.ac.cn), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn), Shude Mao (smao@nao.cas.cn)