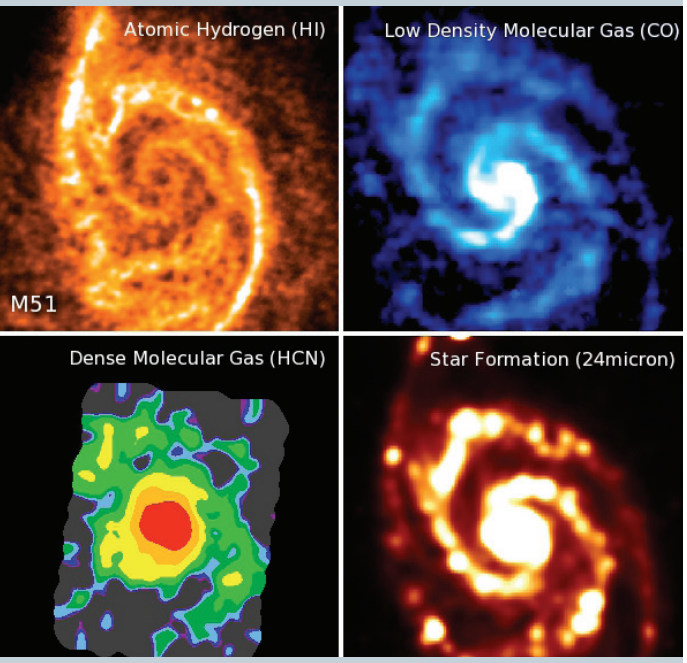
Colloquium

SFB 956

Conditions and Impact of Star Formation

18.07.2016
Monday 3:00 pm

Physikalische Institute Köln
Lecture Hall III
Zülpicher Straße 77 | 50937 Köln



Frank Bigiel
ZAH/ITA, Heidelberg University, Germany

The ISM and Star Formation in Nearby Galaxies

I will provide an overview of various projects in our group studying the properties of the (gaseous) ISM and star formation in nearby galaxies. Specifically, I will cover first results from our IRAM 30m large program EMPIRE, where we map for the first the entire disks of 9 nearby galaxies in several molecular lines (e.g., HCN, HCO+, HNC) tracing the dense, immediately star forming gas. I will introduce the survey and ongoing projects and show first science results, where we relate these observations to existing mapping data from the radio to the UV to assess, e.g., if and how the fraction and star formation efficiency of the dense gas varies across disk galaxies and as a function of local conditions in the ISM. Another focus of my talk will be low-metallicity environments, where molecular lines are often difficult to observe and far-IR cooling lines may be our best handle on their star formation properties. In a series of projects, we model observations of the mid-IR and far-IR cooling lines in the Herschel Dwarf Galaxy Survey to characterize the physical conditions in the ISM of these low-metallicity systems. We find that such environments differ dramatically from those of more metal-rich disk galaxies. Most notably, the former are characterized by harder radiation fields and a porous structure, large filling factors of ionized gas and a large amount of molecular gas not observable using standard tracers like CO emission ("CO-dark gas"). Using velocity-resolved observations from SOFIA/GREAT, we find that this "CO-dark gas" can be up to 200 times more massive than that traced by CO emission.