Microwave gas and dust emission in a sample of nearby galaxies with IRAS and Planck

The multi-wavelength emission of galaxies is a composite emission: stellar emission in the UV/optical, dust emission in the IR, free-free emission and synchrotron in the radio. Each of these emission has a specific spectral shape which is how we are able to disentangle and study them separately. At microwave frequencies, all radiations are superimposed on background CMB fluctuations. The Planck satellite mapped the whole sky in 9 photometric bands in the FIR to the radio. While the resolution is coarse, it matches up nicely the IRAS dataset in the IR and it is sufficient to detect nearby galaxies. Our goal is to study dust emission up from the infrared up to cm wavelengths (including the rarely covered microwave range) to gain insight on dust properties in galaxies in a systematic way.

We have started with a sample of 21 nearby galaxies for which we have built the integrated spectral energy distributions using IRAS and Planck. Our integrated SEDs enable us to get the whole energy from the galaxies (not just the brightest regions detected at high resolution) and to extend the wavelength coverage at microwave frequencies.

I have modelled the integrated spectral energy distribution of these galaxies from their FIR to radio. The SEDs were fitted with simple dust model (broken emissivity black body) as well as the THEMIS full dust model (Jones et al. 2017). The contribution from free-free emission, CMB fluctuations and synchrotron emission is included as well in the fit. I will present the results we obtain for this sample in terms of dust properties and what we learn from including the long wavelengths emission.