

Many studies have shown that the presence of gas and metals influences the amount of dust observed within galaxies. These studies rely on assumptions of how the metallicity varies within the disk and whether the gas and its location relative to dust. These assumptions are often based solely on observable vicinity within the Milky Way limited by extinction. That is why spatially resolved observations of extragalactic sources play an important role in verifying our understanding or whether we were limited by the number of possible targets within the Milky Way, the limitation in resolution, or the coverage such as PHANGS.

With ADAGIO, we observed M31 to obtain spatially resolved optical spectra using the CFHT SITELLE instrument to determine the ISM properties on spatial resolution of 45pc, allowing us to resolve scales smaller than PHANGS in regions further from the center. These spectral maps can enlighten us about the spatial distribution of metals and potential mixing of metals between the HII-regions and the diffuse ISM, feedback processes, resolve cloud properties such as filling factors, the extinction and attenuation of stellar and nebular gas emission, the evolution of dust in the dense and diffuse ISM, and many more aspects. This talk will focus on the ISM properties and the metallicity variation. The talk highlights how these maps help to understand spatially resolved dust-to-gas and dust-to-metal ratios and which environmental properties influence the ratios.