

Estimating the kinetic temperature from HI 21-cm absorption studies: correction for turbulence broadening

Interstellar medium (ISM) is the gas and dust in the relatively empty space between the stars in a galaxy. ISM contains gas in different phases – molecular, neutral, and ionized. The different phases are in rough thermal pressure equilibrium, and the main constituent of the ISM is hydrogen in molecular, atomic or ionized form. To study the physical condition of the diffuse neutral ISM, the classic way is to compare the HI 21 cm emission and absorption spectra. Absorption spectra are normally taken towards distant background quasars, and compared with emission spectra from nearby lines of sight. Emission spectra are more conveniently taken with single dish radio telescopes where as absorption spectra are taken with radio interferometers. But in reality, there are several uncertainties and challenges for single dish observations due to systematic or instrumental effects. So, the final results that come out by comparing the emission and the absorption spectra are less reliable. Now, one way to solve these problems is to use only the more reliable interferometric absorption spectra to infer the properties of the gas. I have used a method to study the properties of diffuse ISM using only absorption spectra and apply this to published data from an ongoing absorption line survey and see that the results are in broad agreement with theoretical expectation. (MNRAS, 483,593(2018), arXiv:1811.07352)