Abstract

The epoch of reionization(EoR) is usually studied with hyperfine transition in neutral hydrogen(1.42 GHz). 3He II hyperfine transition provides an alter- native technique to observe EoR. It has much higher frequency(8.66 GHz), therefore the signals from EoR are at frequencies for which the foreground isless problematic. It has similar emission mechanism as that of the 21 cm line,but arises from the ionized region of inter-galactic medium (IGM). Therefore it will directly map the ionized gas and will be anticorrelated with the 21cm maps. At early stages of reionization collisions are the only factors responsible for decoupling spin temperature with gas temperature. Therefore in this thesis we attempted to calculate the collisional de-excitation rates. We have used two approach for these calculations (i) semi-analytic and direct numerical.