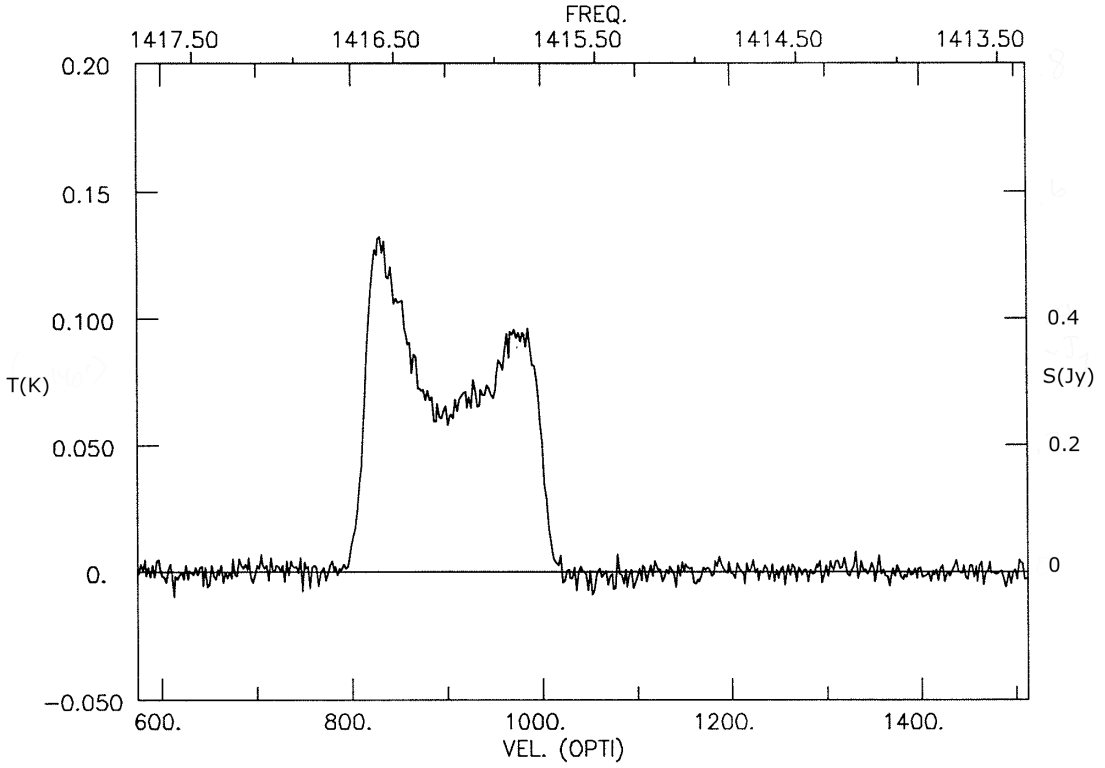
Stars and Galaxies

Coursework Sheet 5

1. Starting from the ideal gas law show that the pressure of a gas is proportional to its number density, n, in particles per m^{-3} times its temperature, T. By taking the typical physical parameters show that H II regions will expand into the molecular clouds that surround them.

(5 marks)

2. The diagram below shows the spectrum of the H I 21 cm line from a typical spiral galaxy.



The top axis is the observed frequency in MHz. The rest frequency of the H I line is 1420.4 MHz. Use the Doppler shift to show that the bottom axis is the radial velocity of the emitting gas in kms^{-1}.

(2 marks)

What is the radial velocity of the galaxy as a whole?

(1 mark)

Estimate the rotational velocity of the galaxy from the profile of the emission.

(2 marks)