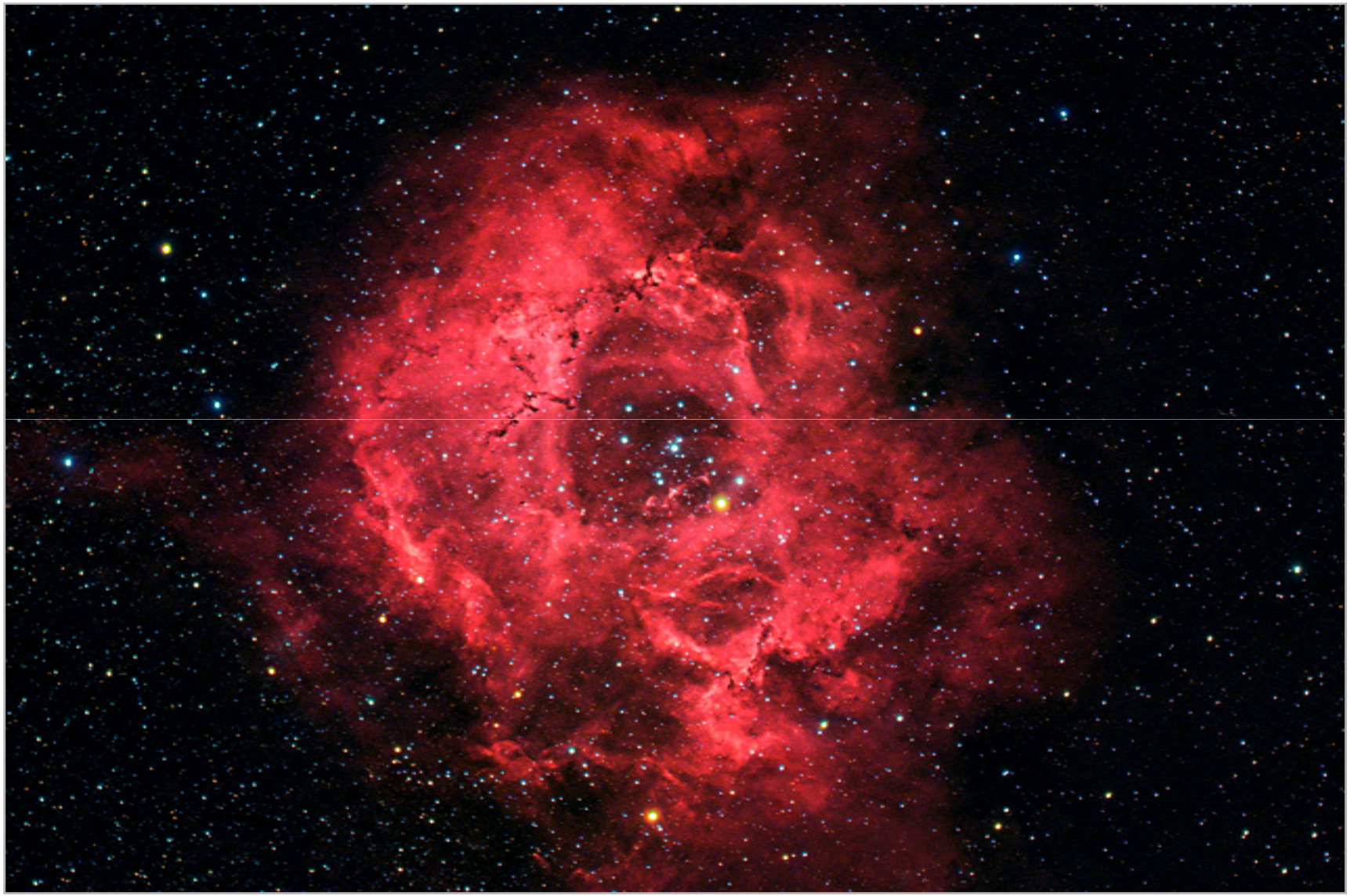
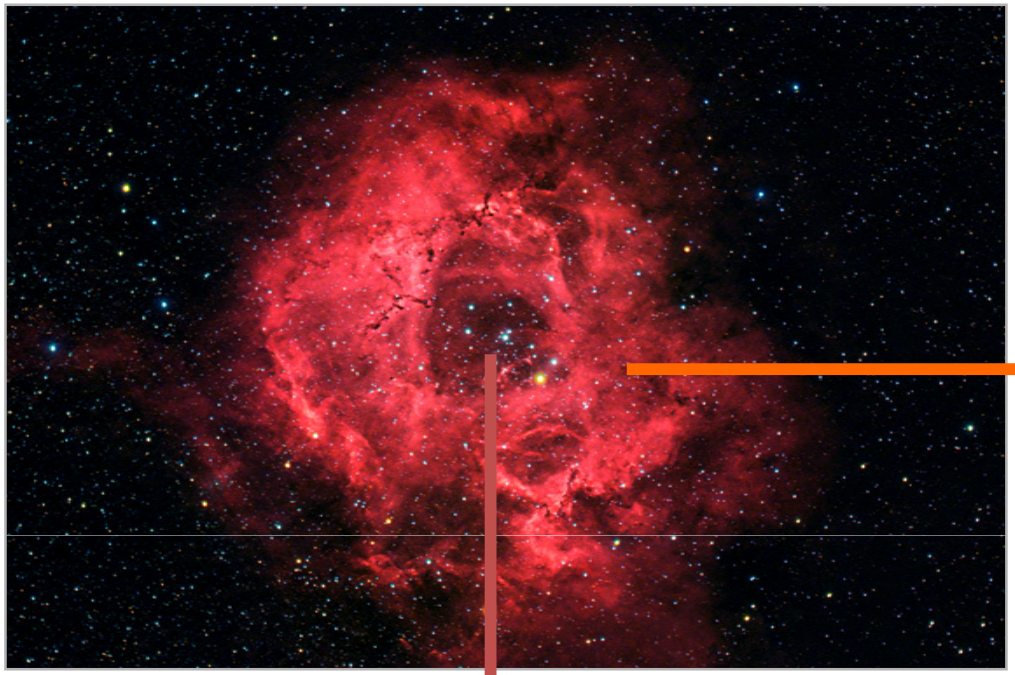
Warm Ionized Medium of the ISM



Rosette Nebula through a Hydrogen Balmer α filter

Warm Ionized Medium of the ISM



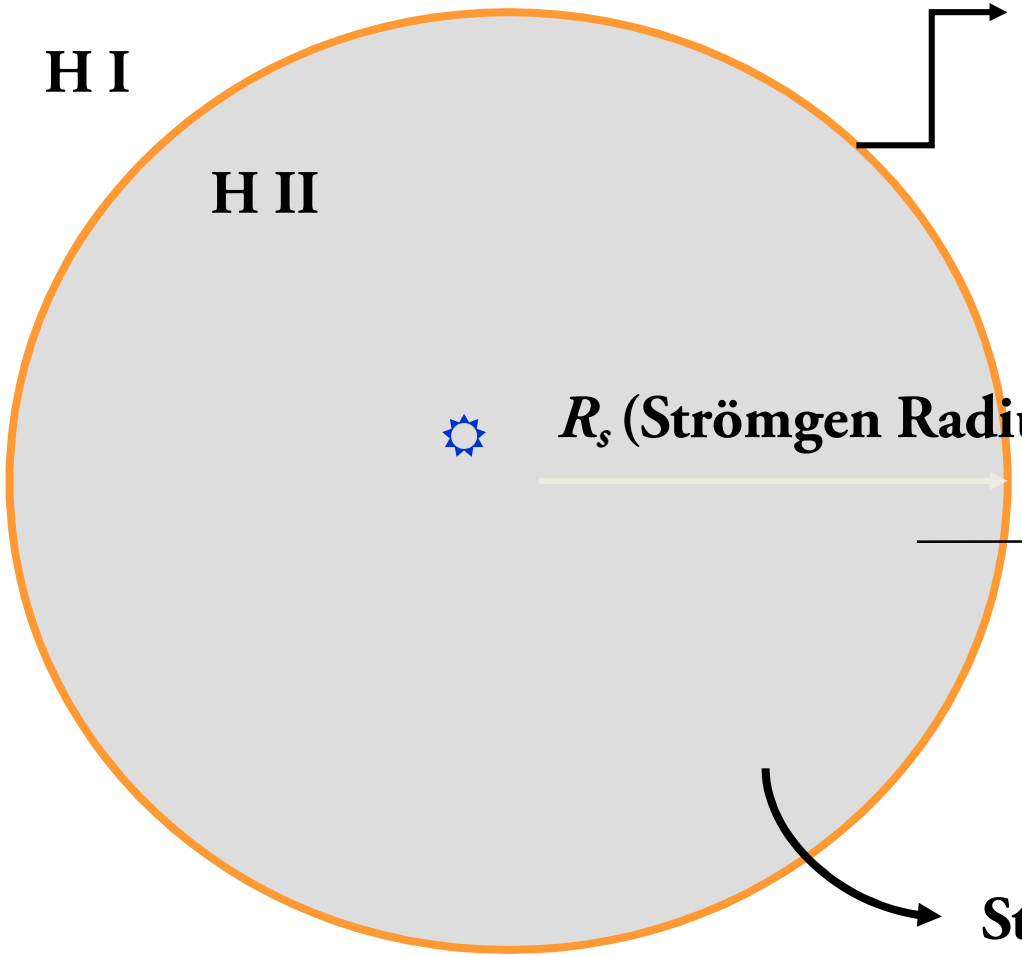
H II region

Massive (15 $M_\odot$ < M < 90 $M_\odot$) stars
with T ~ 35,000 K

Warm Ionized Medium of the ISM

- The expanding gas in a planetary nebula is ionized by the UV radiation from the white dwarf.

The Size of H II Regions – Strömgen Sphere

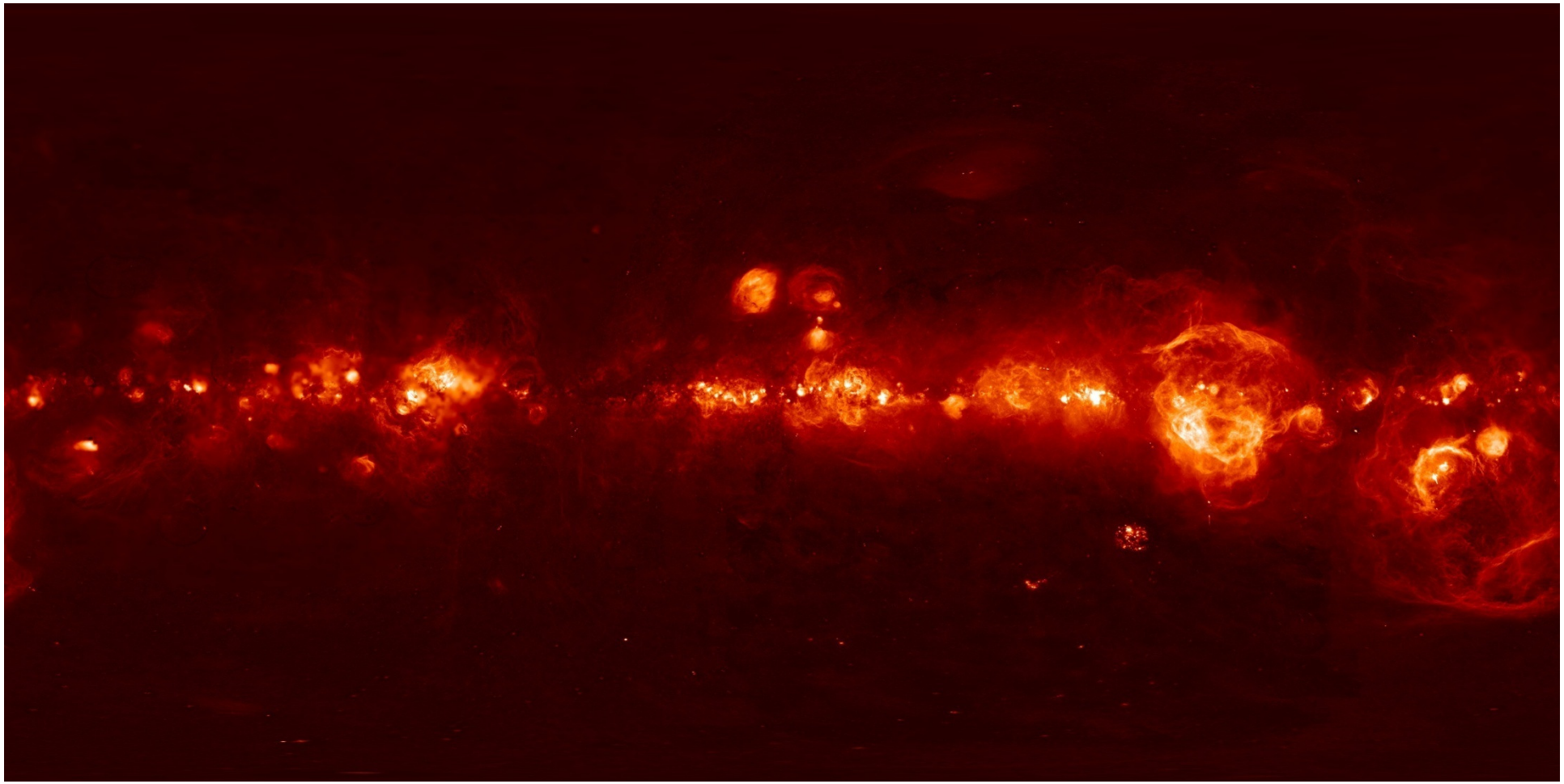


Ionization Front / Edge
Rapid transition from fully ionized to fully neutral gas.

The KE of the free electrons and protons will define the temperature of the gas, T ~ 10^4 K.

Strömgen Sphere

Warm Ionized Medium (WIM) of the Galaxy

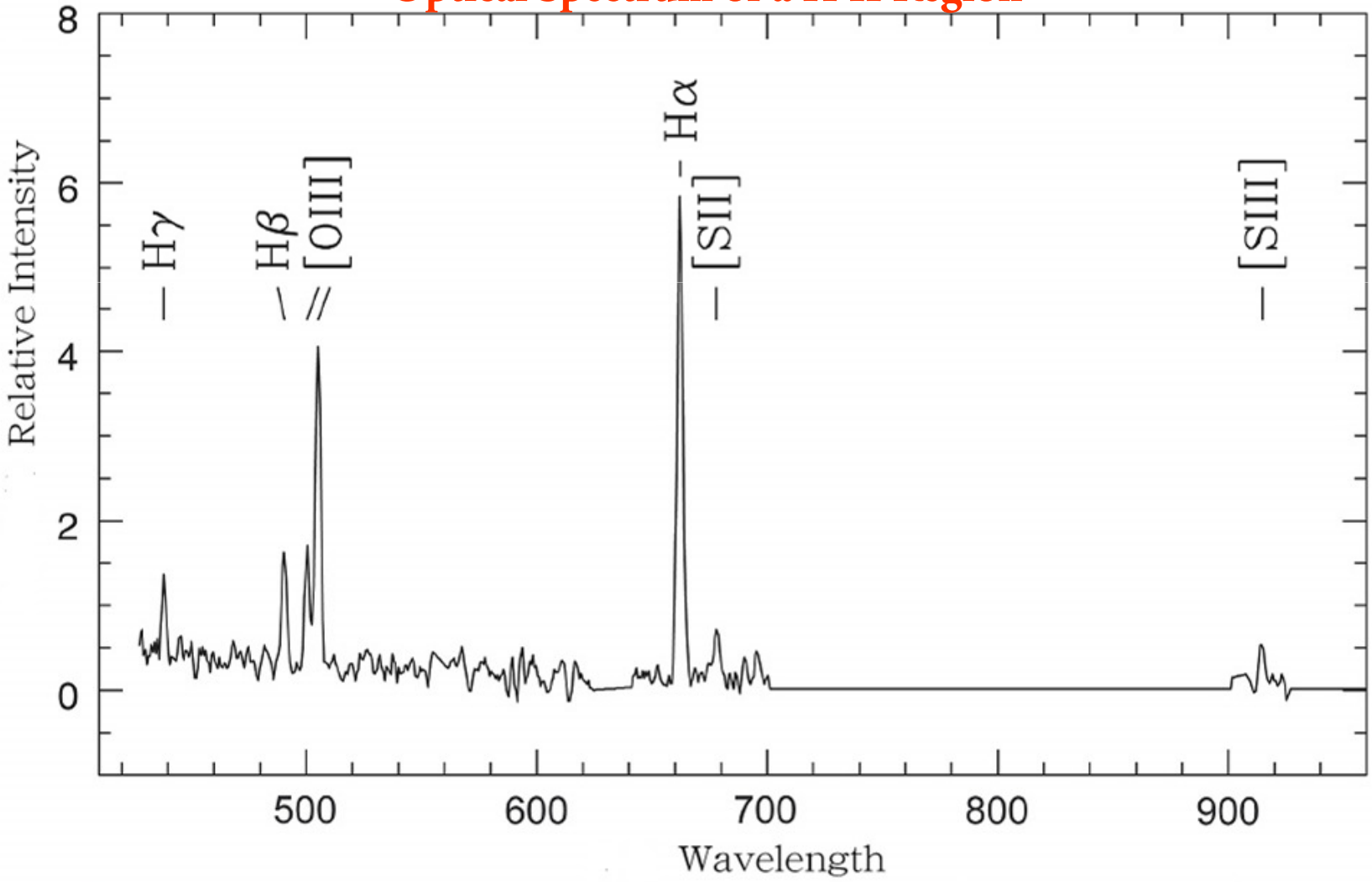


Composite image of the Galaxy taken in Hα by three different sky surveys; the Wisconsin H-Alpha Mapper WHAM, Virginia Tech Spectral-Line Survey (VTSS) and the Southern H-Alpha Sky Survey Atlas (SHASSA) © Finkbeiner (2003)

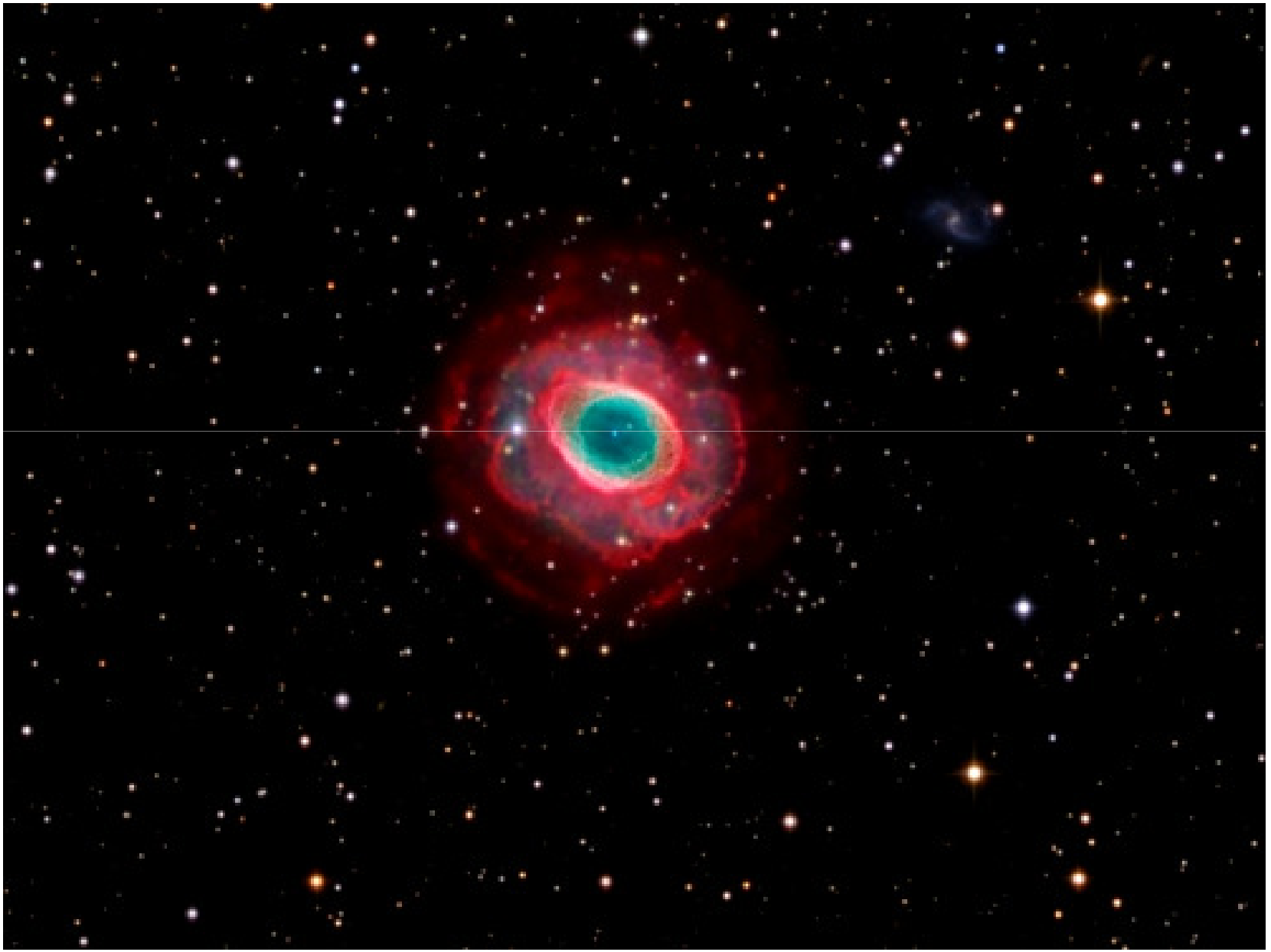
The Glow of H II Regions

- **The optical light from the nebulae is due to recombination of free electrons with ions, followed by de-excitation.**

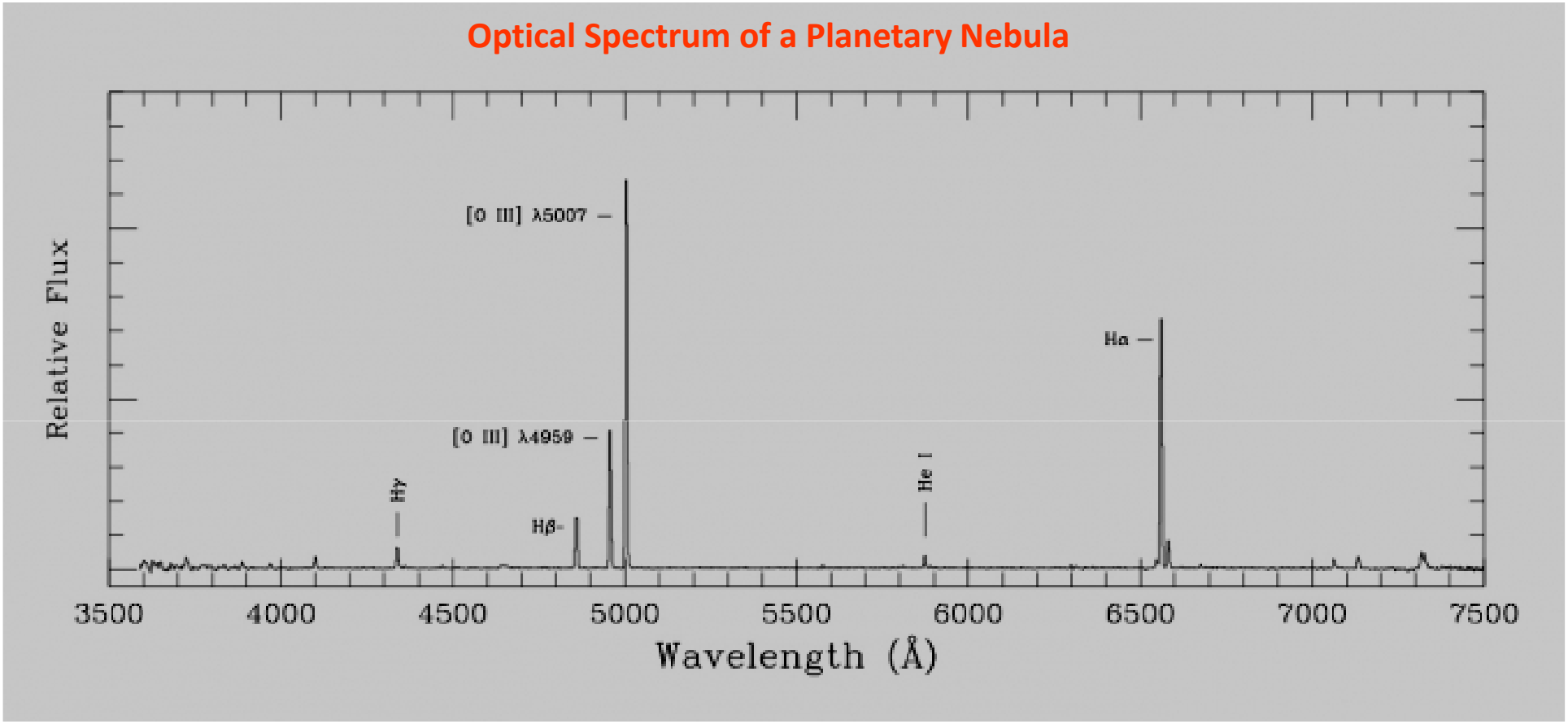
Optical Spectrum of a H II Region



PNe Similar to H II Regions



PNe Similar to H II Regions



PNe are not black bodies. Brightness of PNe is from line emissions at specific wavelengths due to recombinations happenings in the ionized gas. There is very little continuum flux.

Spectrum of Ring Nebula as Recorded on the CCD Camera