

Questions of the Day

- How do we detect the presence of current star formation in galaxies?
- How is neutral hydrogen distributed in galaxies?
- How do star formation and density affect the transitions between different gas phases?
- What are major differences between early and late type galaxies?
- What is the Hubble sequence, and how do the properties of galaxies vary along it?

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Gas & Dust in galaxies = "Interstellar Medium"

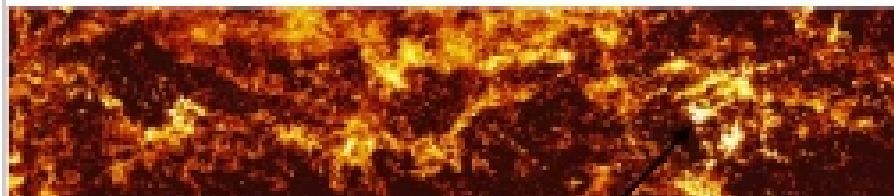
This gas has a range of densities and temperatures:

Cold & Dense = Molecular (H_2) + Dust
Warm = Atomic! (HI)
Hot & Diffuse = Ionized! (HII)

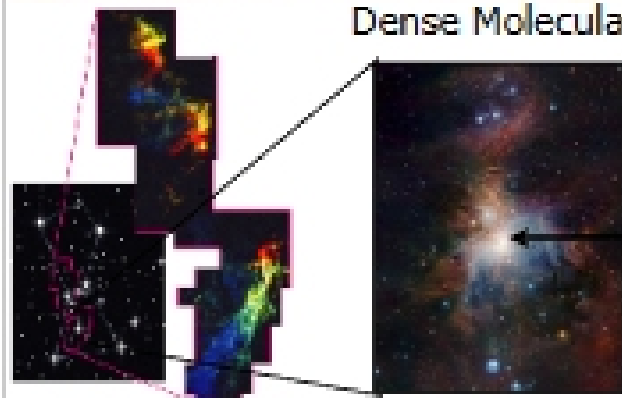
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Molecular gas in the Milky Way...



Dense Molecular Clouds



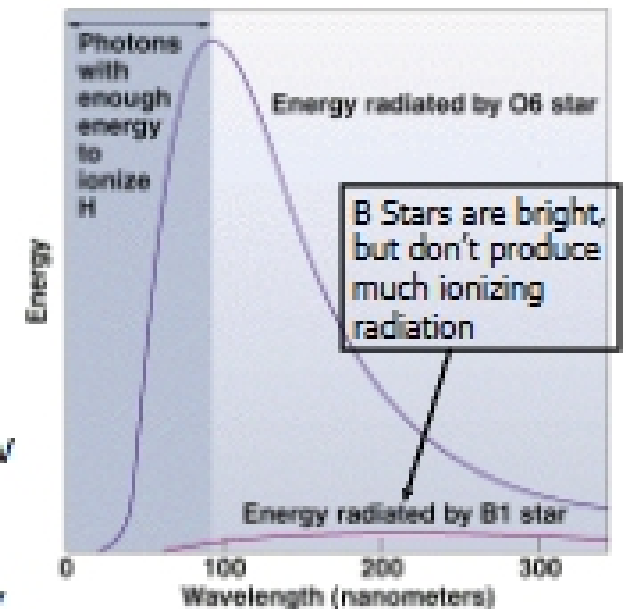
Young stars

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O Stars destroy molecules and ionize Hydrogen

- They produce almost all of the UV light necessary to ionize Hydrogen
- Not many, but very destructive!



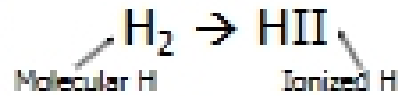
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The Orion Nebula

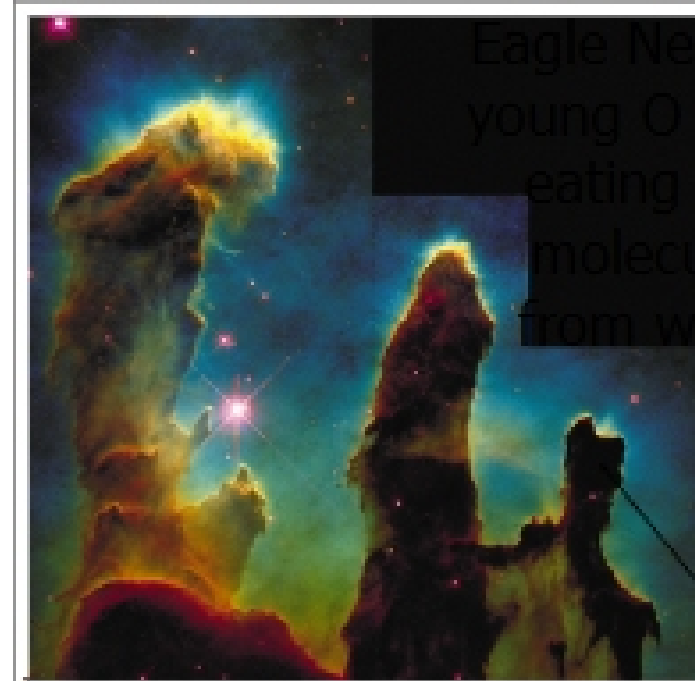
Star formation transforms the host molecular cloud



"HII Region"

Hot young O & B stars ionize and heat the surrounding gas.

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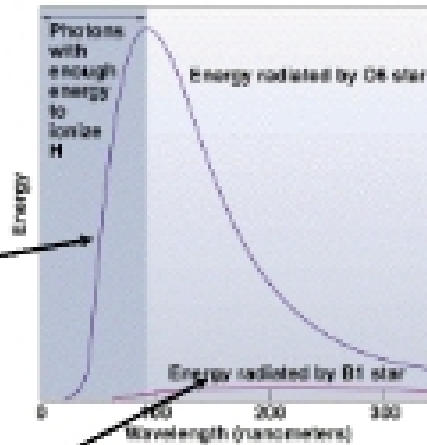
Eagle Nebula: Hot young O & B stars eating away the molecular cloud from which they formed!

Gas is still molecular in the columns...

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O Stars live for only a few million years

When these are gone...

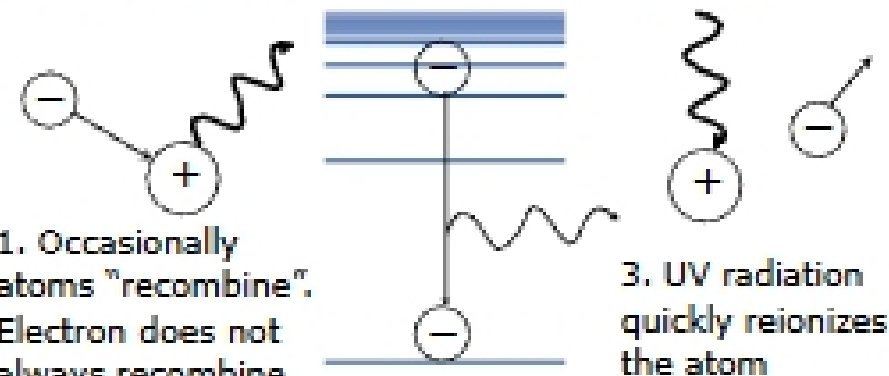


...no stars are left to ionize the gas!

If you see ionized gas, you know that there are recently formed O stars.

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Ionized gas can be detected through "recombination" emission lines:



1. Occasionally atoms "recombine". Electron does not always recombine to the ground state

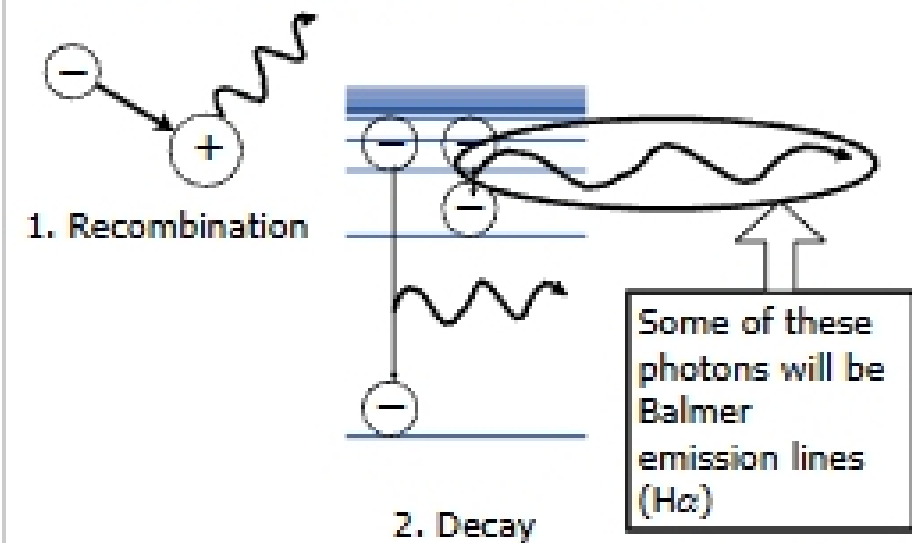
2. Electron drops down a level

3. UV radiation quickly reionizes the atom

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"Recombination" Radiation



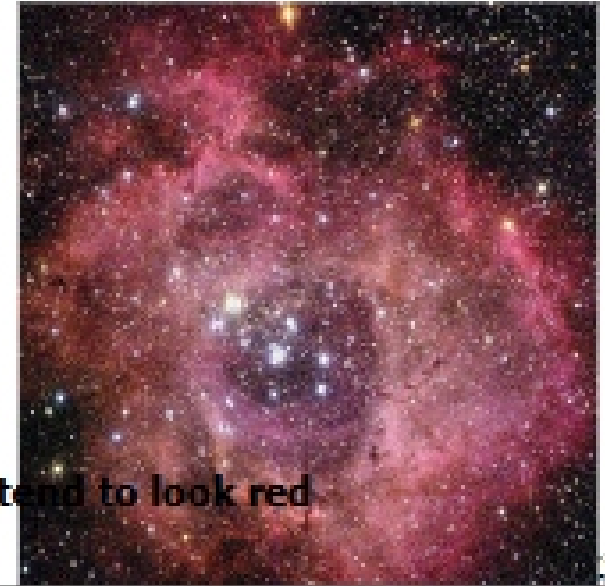
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The Rosette Nebula

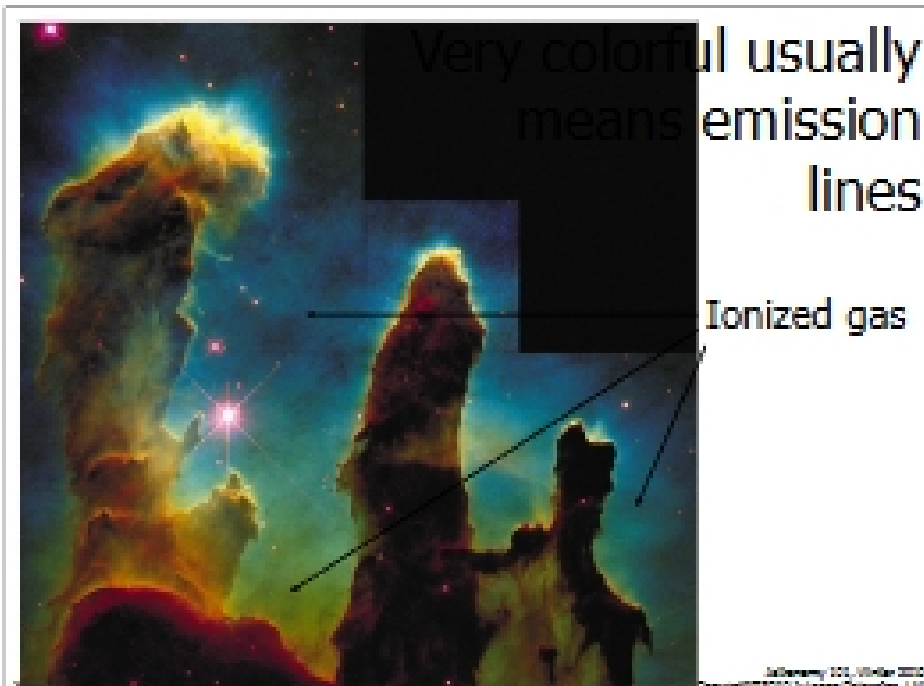
Most of the diffuse filamentary red stuff is produced by H-alpha emission lines.

HII Regions tend to look red



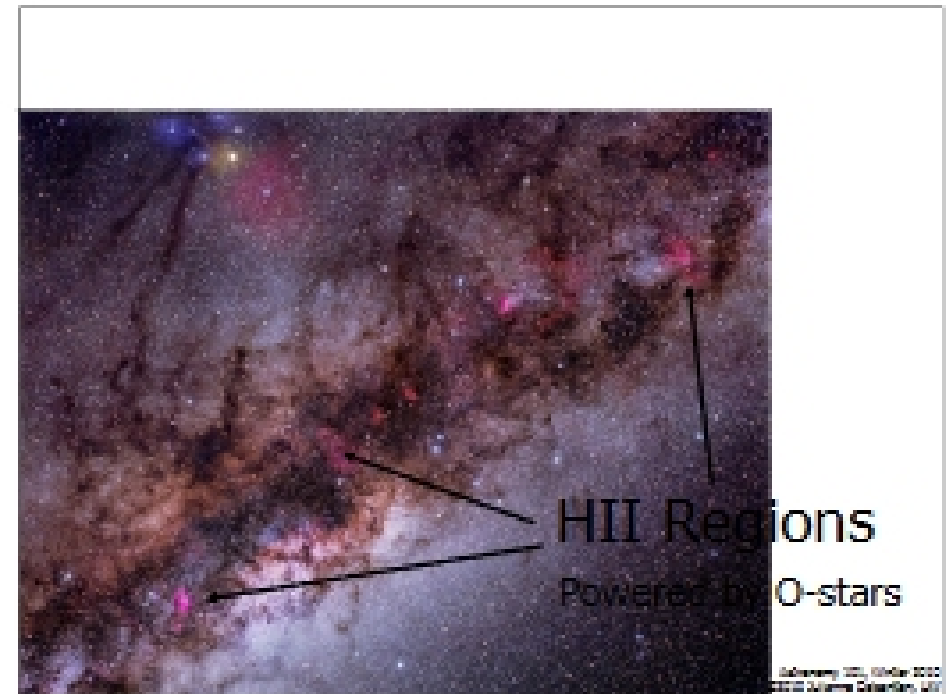
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