Figure 9.6
Fraction of mass that is helium, *Y*, plotted against relative oxygen abundance O/H (by numbers) from H II regions in our Galaxy, and in irregular and blue compact dwarf galaxies.

X, H
Y, He
Z, rest
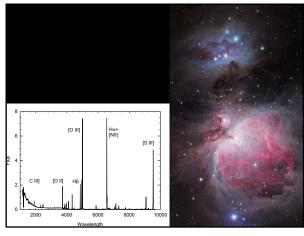
O (nebulae)
Fe (stars)
Proxy for Z

1

Vary Metals –temperature balance

- **Model varyZ.in**
  - Z varies by 3 dex
  - How does O/H and [O III]/Hβ vary with Z?
- **First try coronal equilibrium (constant temperature)**
- **Then with energy balance (thermal equilibrium)**

2

3

Thermostat effect AGN3 S9.5

- **Vary metals with temperature balance**
  - varyZ.in
- **Look at line ratios, temperature vs Z**
- **Cooling and heating vs Z**
- **Thermostat effect – line spectrum does not change dramatically when Z changes**
  - Heating and cooling are equal
  - Cooling is mainly O III lines
  - So they are constant when they are the main coolant

4

Strong forbidden lines

- **Measure SED, not O, N abundance**

5

Strong forbidden lines

- **Measure SED, not O, N abundance**

Could you have made this more complicated?

6

7