The optimizer

- **Hazy 1 Chap 17**
- **Examples in tsuite / auto**
  - ls *optim*.in

Downhill simplex

- **Evaluate sum of differences between predictions and observations at every set of parameter**
- **Vary the parameters to minimize this sum of errors**

$$\chi_i^2 = \left(\frac{F_i^m - F_i^0}{\min(F_i^m, F^0)\,\sigma} \right)^2 \qquad (17.1)$$

Specify observed quantities

- **Series of "optimize" commands**
- **Column density**
  - optimize column densities
  - hydrogen 1 < 17
  - carbon 4 17.4 error =.001
  - silicon 3 14.6 // The Si+2 column density
  - end of column densities

Luminosity or intensity of normalization line

- optimize intensity -0.3
- normalize to "O 3" 5007
- // we want a 5007 luminosity of 10^34.8 erg/s
- optimize luminosity 34.8

Line spectrum

- optimize lines
- O 3 5007 intensity =13.8 error =0.1
- Blnd 3727 < 2.1 (only upper limit)
- O 3 88.33m 1.2
- O 1 145.5m 1.6
- end of lines

Temperatures

- optimize temperature
- Hydrogen 1 36200K volume
- H2 0 150K radius
- end of temperatures

Controlling the optimizer

- **Hazy 1 Sect 17.7**
  - Optimize increment = 0.4 dex
  - Optimize iteration = 1000
  - Optimize range -2.3 to 3.9
  - Optimize tolerance 0.01