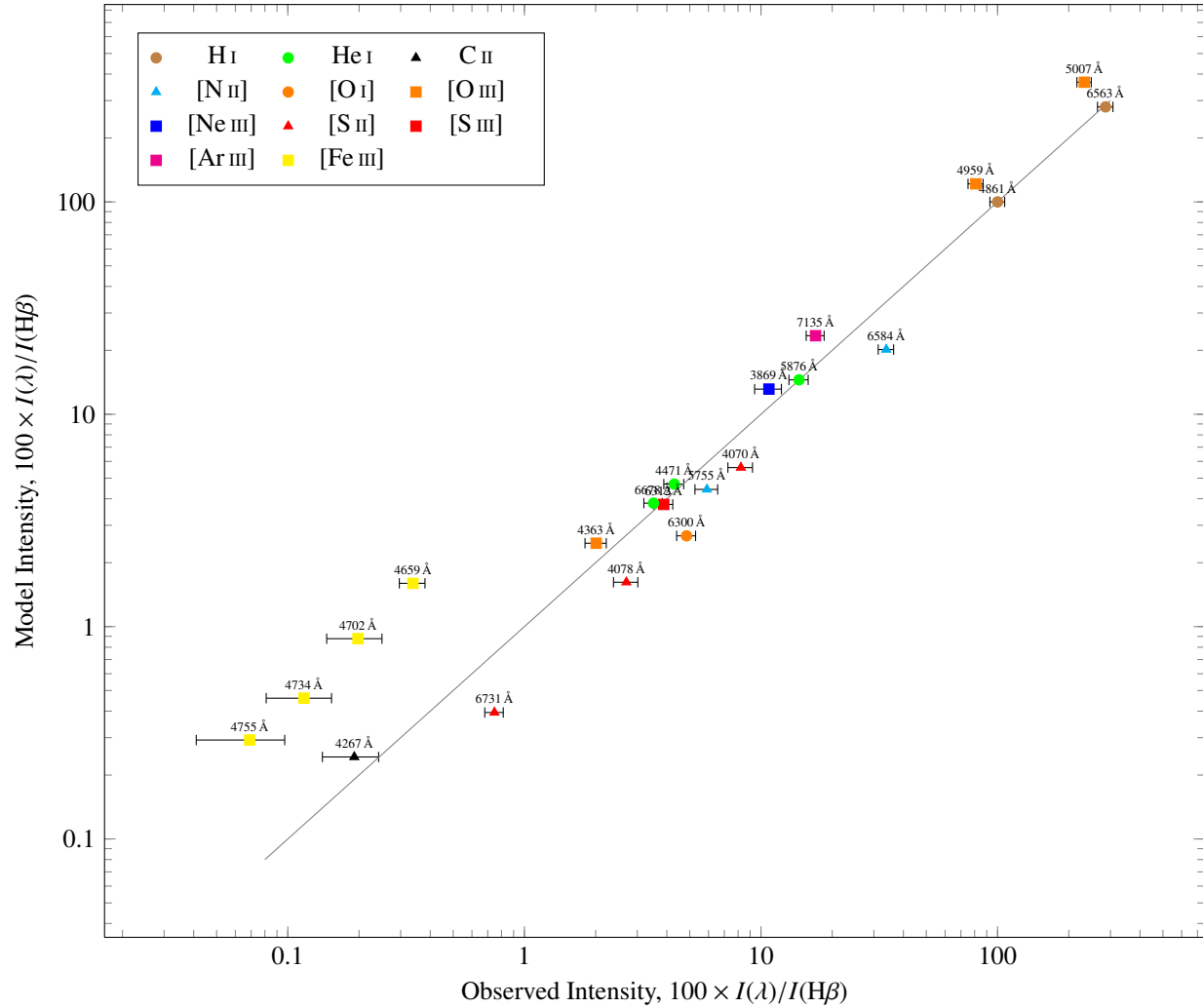# Model A: Baseline model

Spectrum WMBasic, 39 000 K

Flux $\log_{10} \Phi = 13.50$
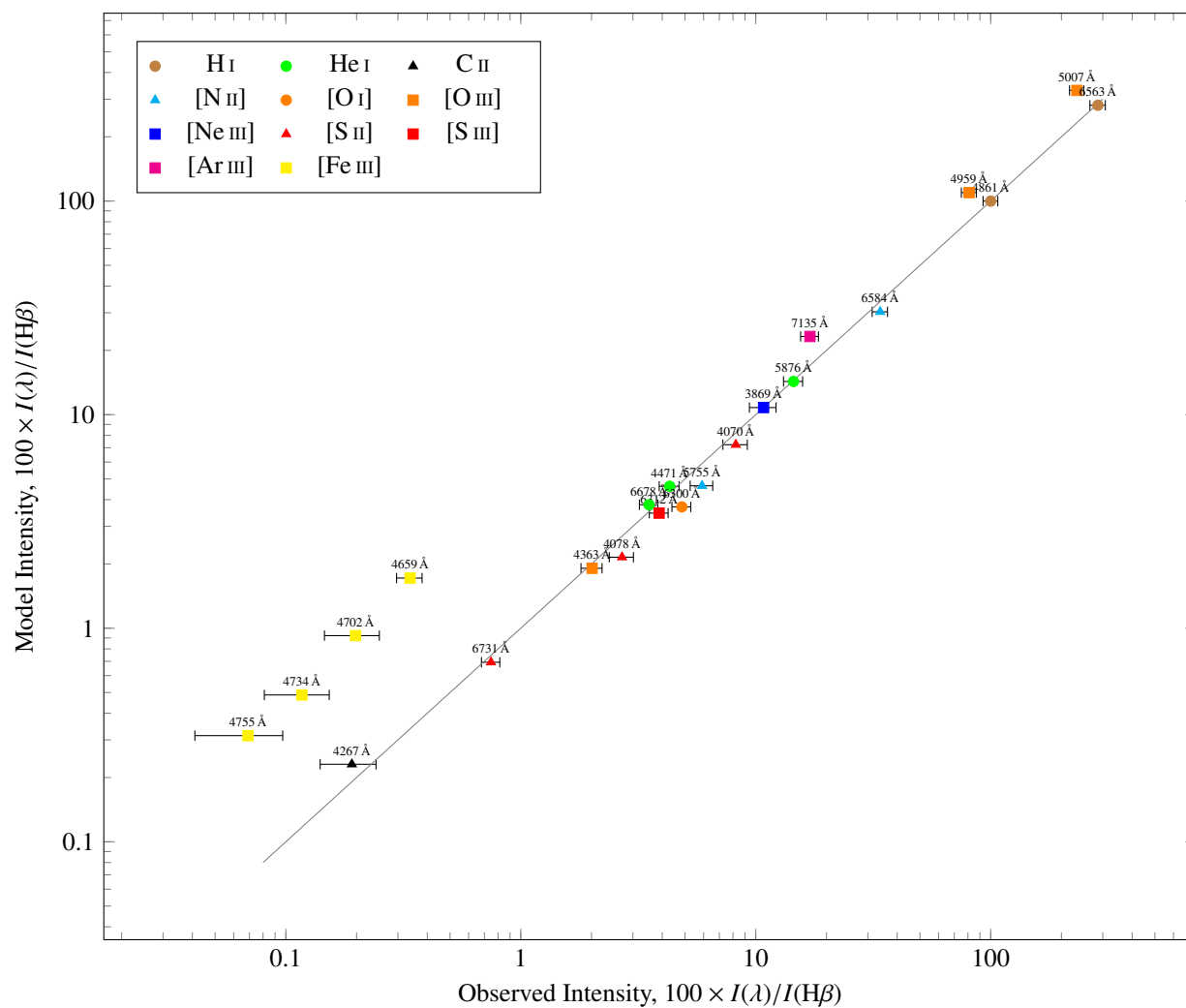
Abundance set Cloudy Orion

- Significant disagreement with observations

- Low ionization lines are too weak; high ionization lines are too strong

- Iron lines are far too strong – presumably due to abundance

- Same for Argon line

Model B: Lower flux

Spectrum WMBasic, 39 000 K

Flux $\log_{10} \Phi = 13.20$
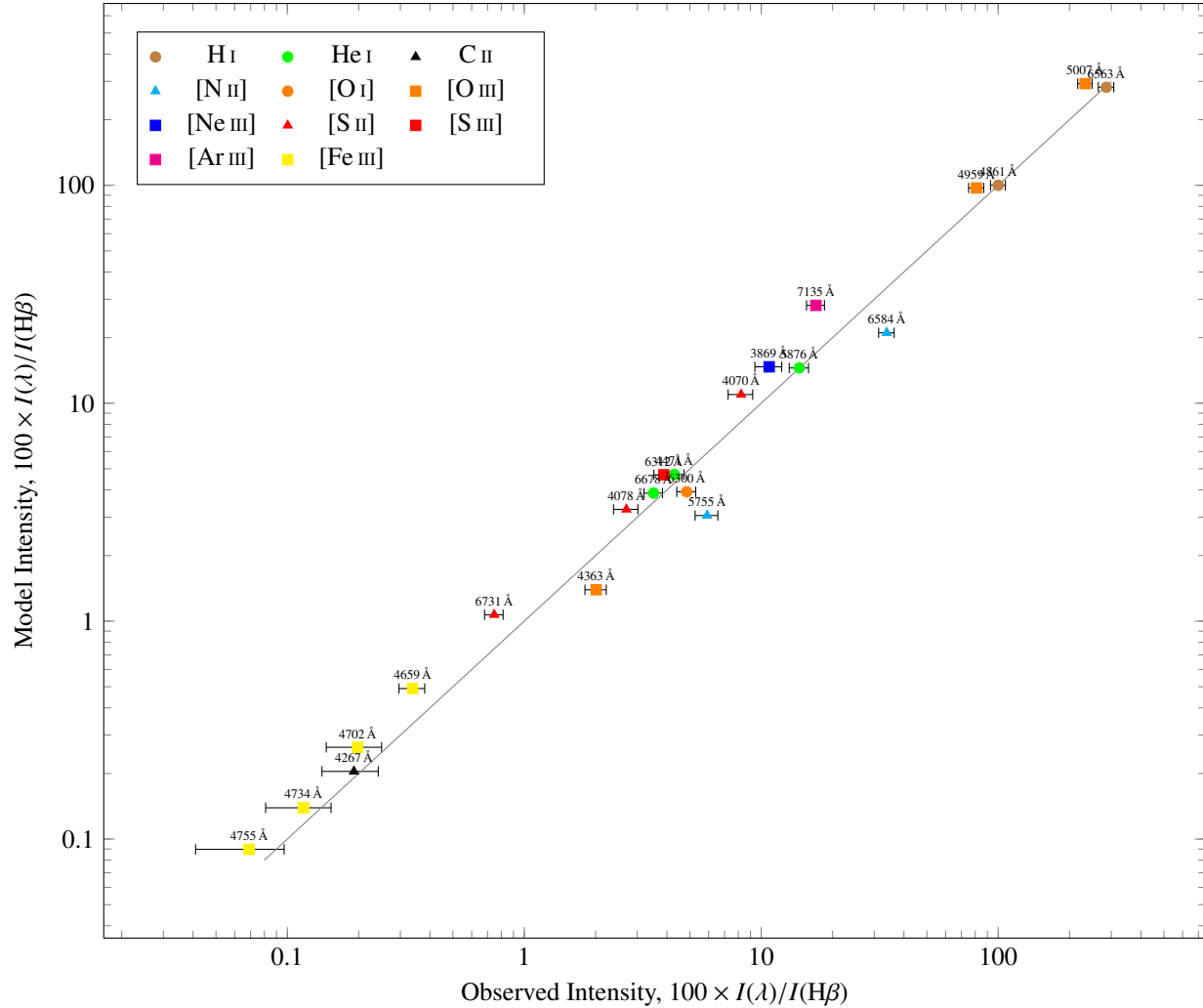
Abundance set Cloudy Orion

- Much better agreement, but still some differences

- [O I] is 30% (0.11 dex) too weak; [O III] nebular lines are 30% too strong (but auroral line is OK)

- [N II], [S II], and [S III] are all marginally too weak by 10–20%

- Iron and Argon are the same as in A

Model C: Esteban abundances

Spectrum WMBasic, 39 000 K

Flux $\log_{10} \Phi = 13.50$

**Abundance set** Esteban et al. (2004), M42, $t^2 = 0.002$

- Slightly better than A in some respects, but worse in others

- [Fe II] is now much better, but Argon and Neon are worse because the abundance went up

- [O III] still has the nebular lines too strong, but now the auroral line is too weak as well. The temperature in the high-ionization zones is obviously too high

- Nitrogen is now too weak, and sulphur too strong, which can be directly ascribed to the changed abundances

Model D: Tsamis abundances

Spectrum WMBasic, 39 000 K

Flux $\log_{10} \Phi = 13.50$

**Abundance set** Tsamis et al. (2011), LV2
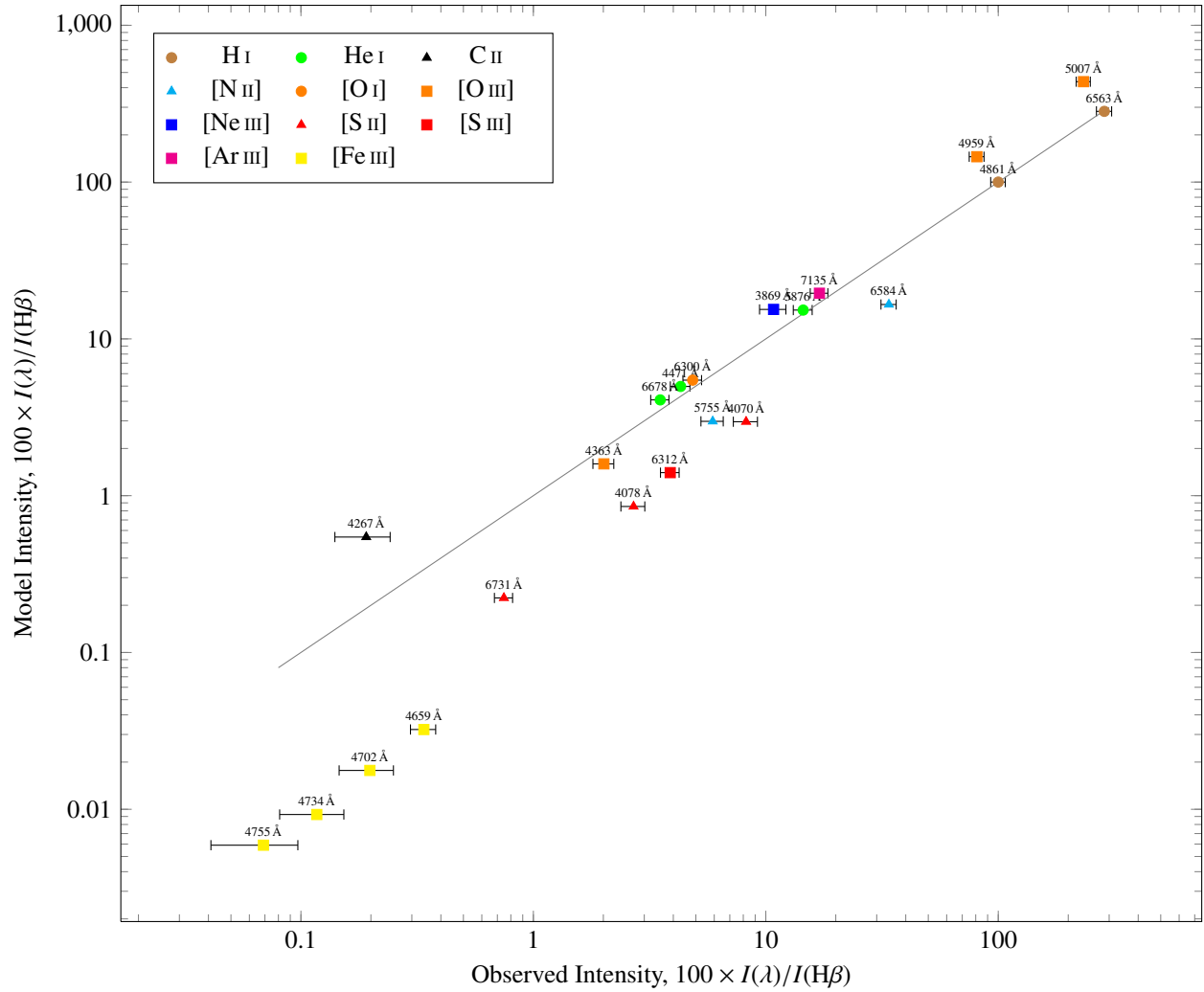
- This is all over the place. These abundances can definitely be ruled out.

- Iron, Sulphur, and Nitrogen are too weak

- Carbon is too strong, due to increased abundance

- However, Argon is much improved, as is [O I]

- The [O III] auroral/nebular ratio is still too small

Model E: Tlusty atmosphere

Spectrum Tlusty, 39 000 K

Flux $\log_{10} \Phi = 13.50$
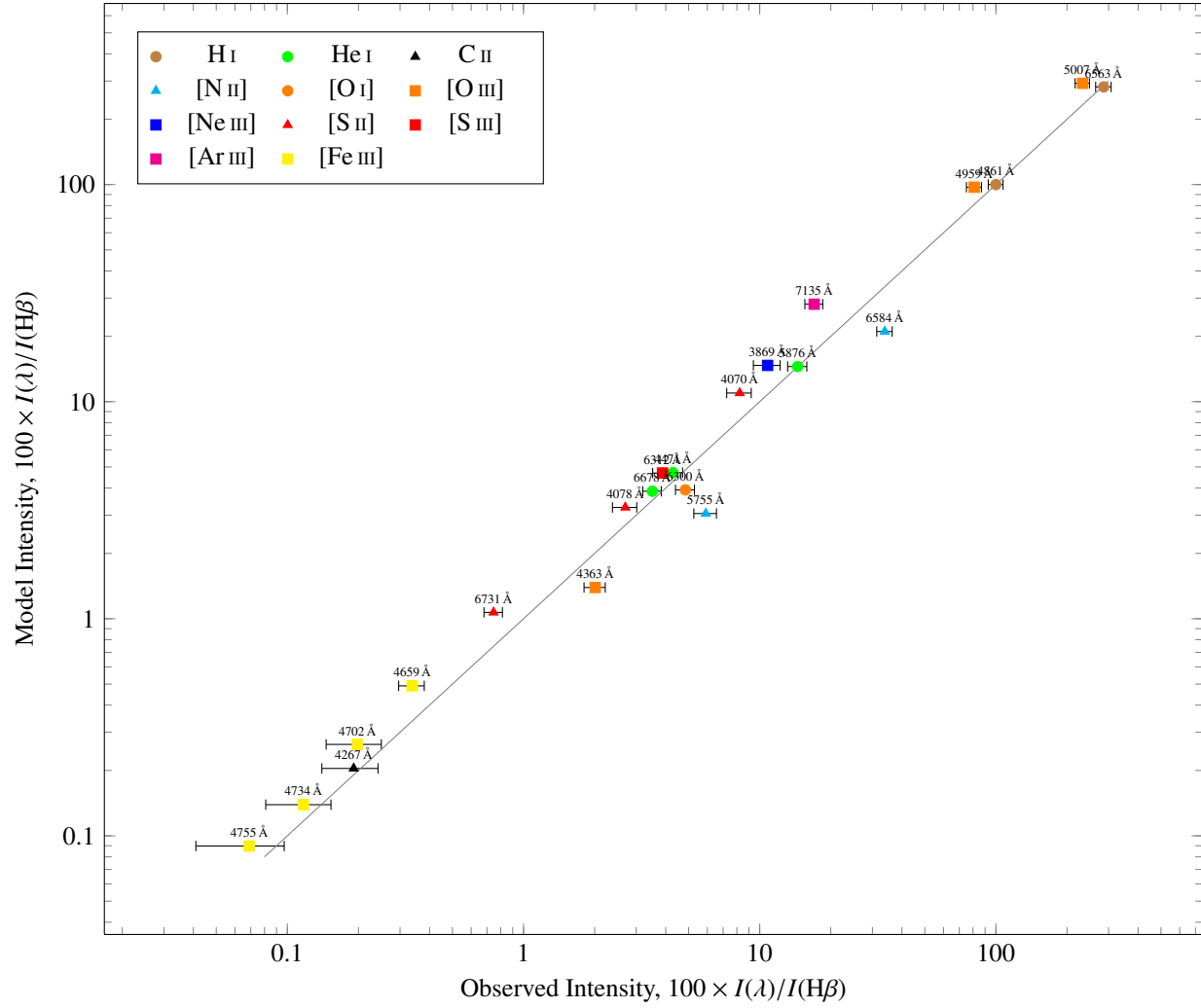
Abundance set Cloudy Orion
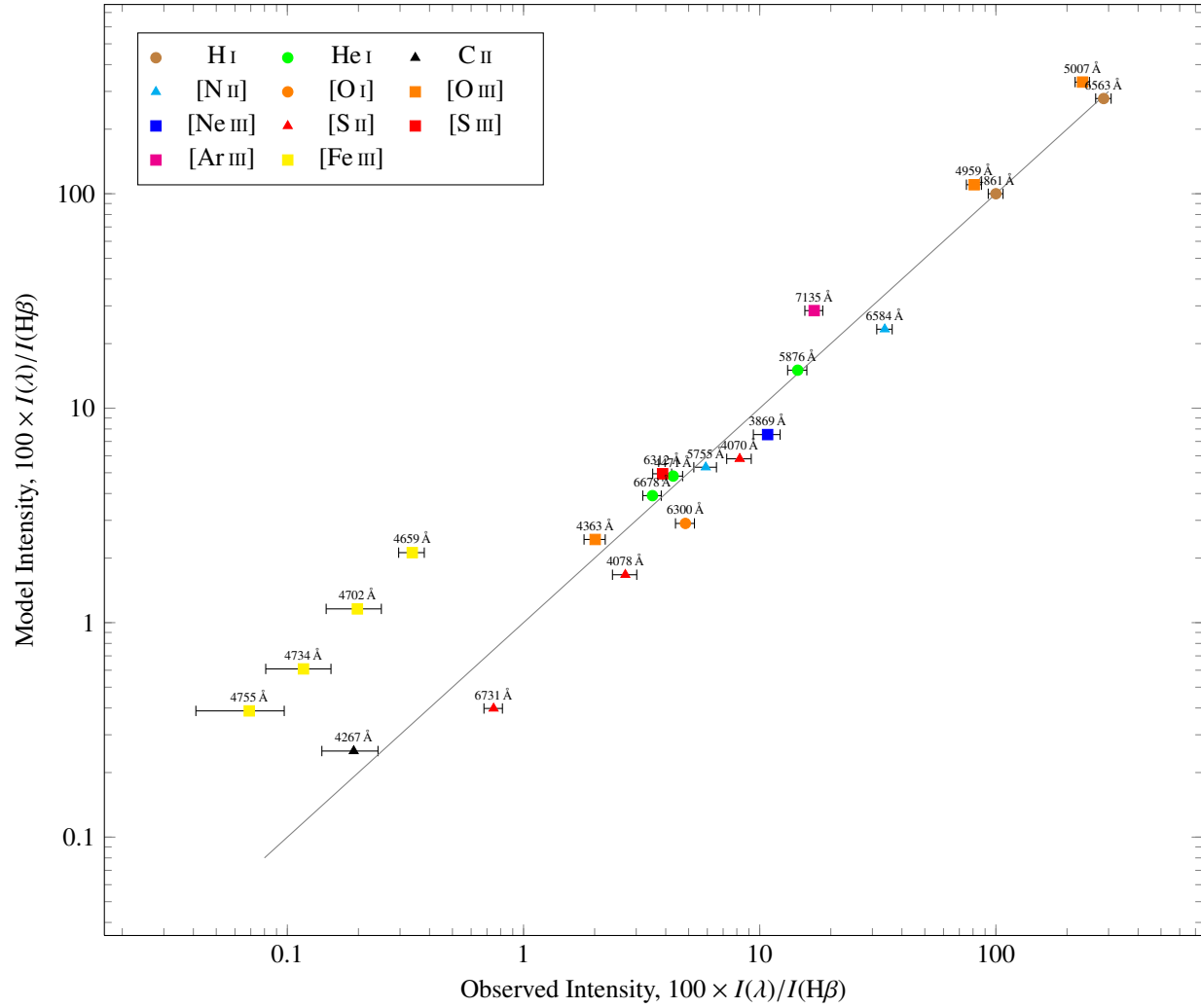
Model F: Lower flux and Esteban

Spectrum WMBasic, 39 000 K

Flux $\log_{10} \Phi = 13.20$

Abundance set Esteban et al. (2004), M42, $t^2 = 0.002$

Model G: Intermediate flux and Esteban

Spectrum WMBasic, 39 000 K

Flux $\log_{10} \Phi = 13.35$

Abundance set Esteban et al. (2004), M42, $t^2 = 0.002$