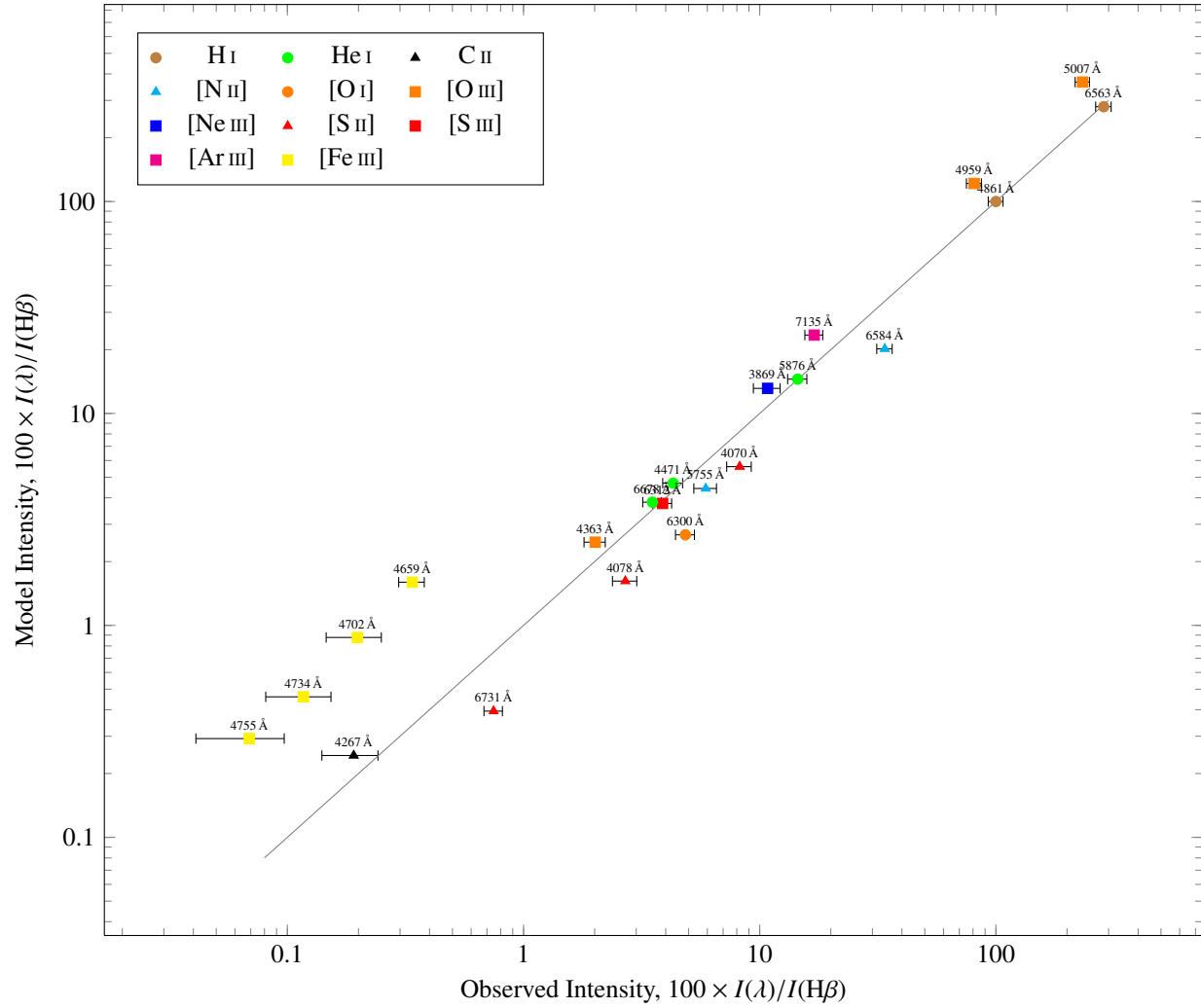


## Model A: Baseline model

**Spectrum** WMBasic, 39 000 K

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

**Abundance set** Cloudy Orion



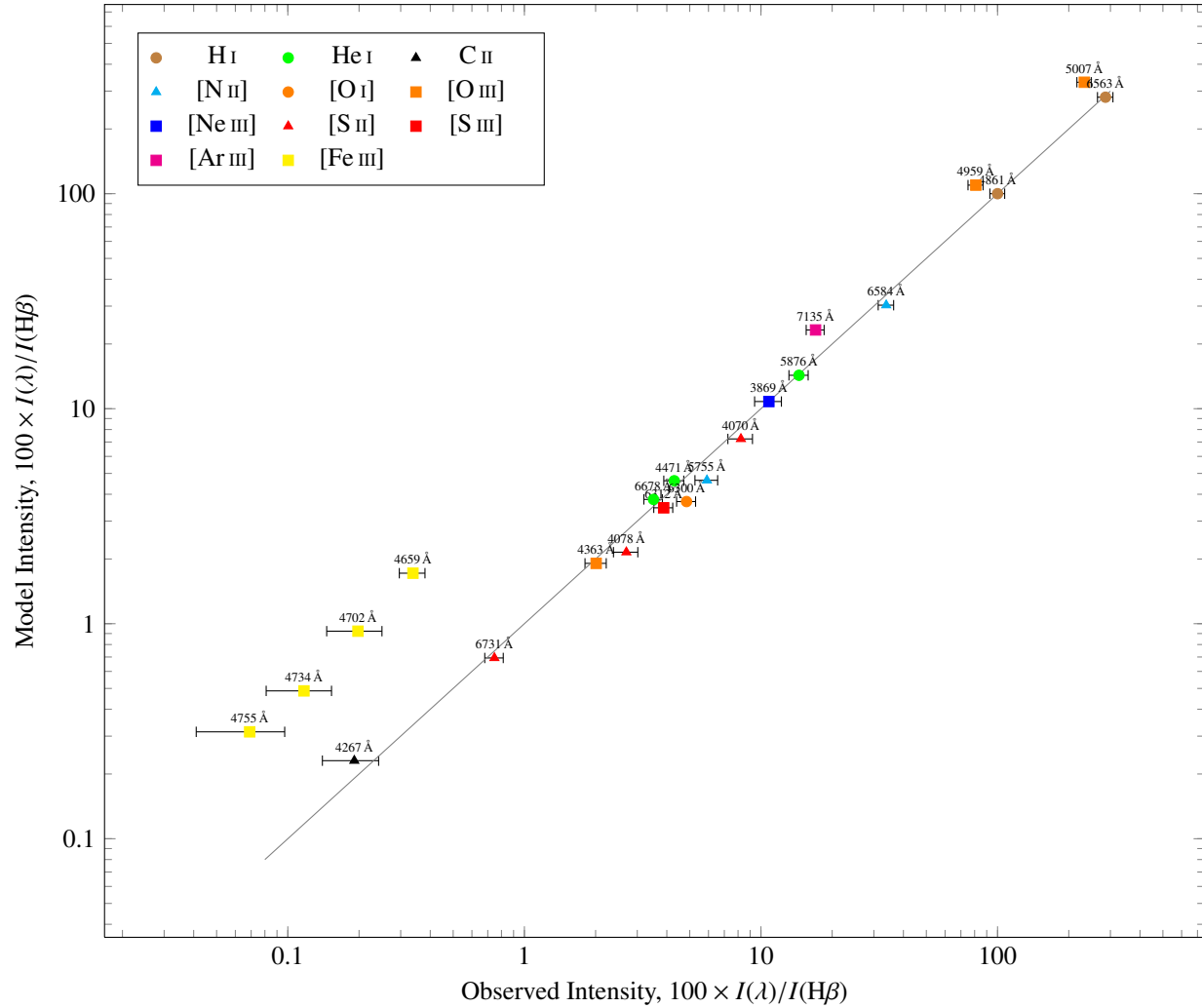
- Significant disagreement with observations
- Low ionization lines are too weak; high ionization lines are too strong
- Iron lines are far too strong – presumably due to abundance
- Same for Argon line

## Model B: Lower flux

**Spectrum** WMBasic, 39 000 K

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

**Abundance set** Cloudy Orion

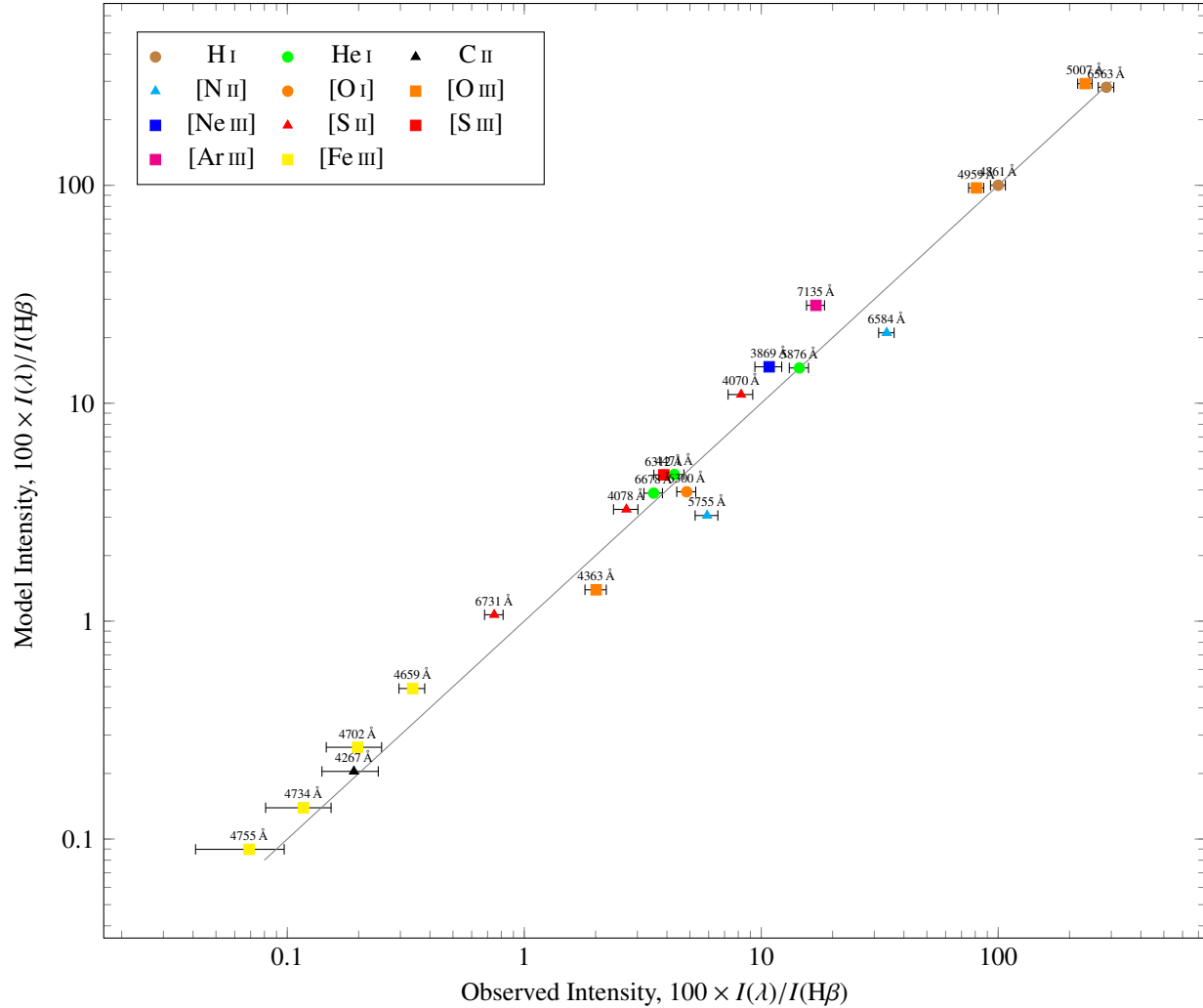


## Model C: Esteban abundances

**Spectrum** WMBasic, 39 000 K

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

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



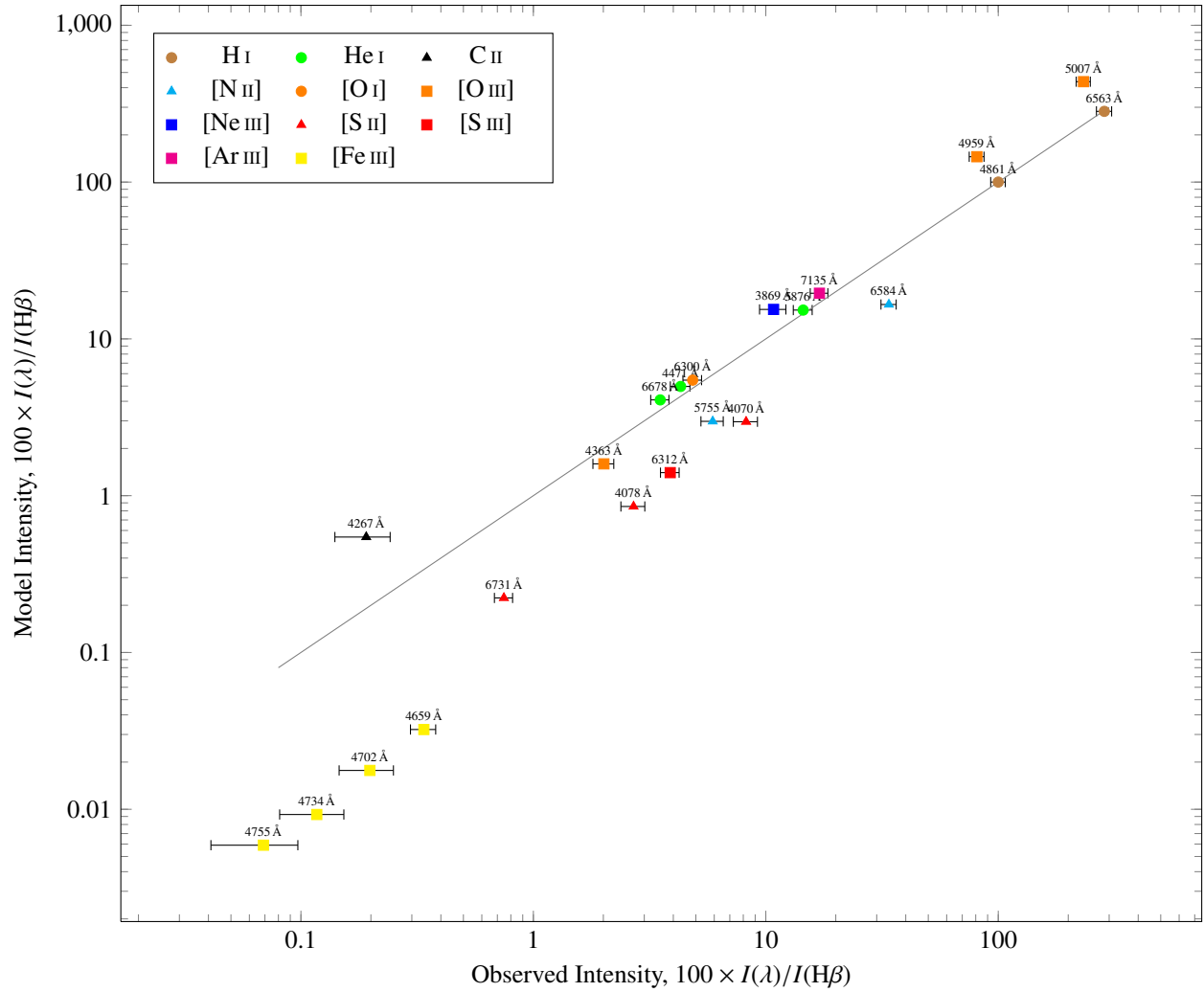
- Slightly better than A in some respects, but worse in others
- [Fe II] is now much better, but Argon and Neon are worse because the abundance went up
- [O III] still has the nebular lines too strong, but now the auroral line is too weak as well. The temperature in the high-ionization zones is obviously 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



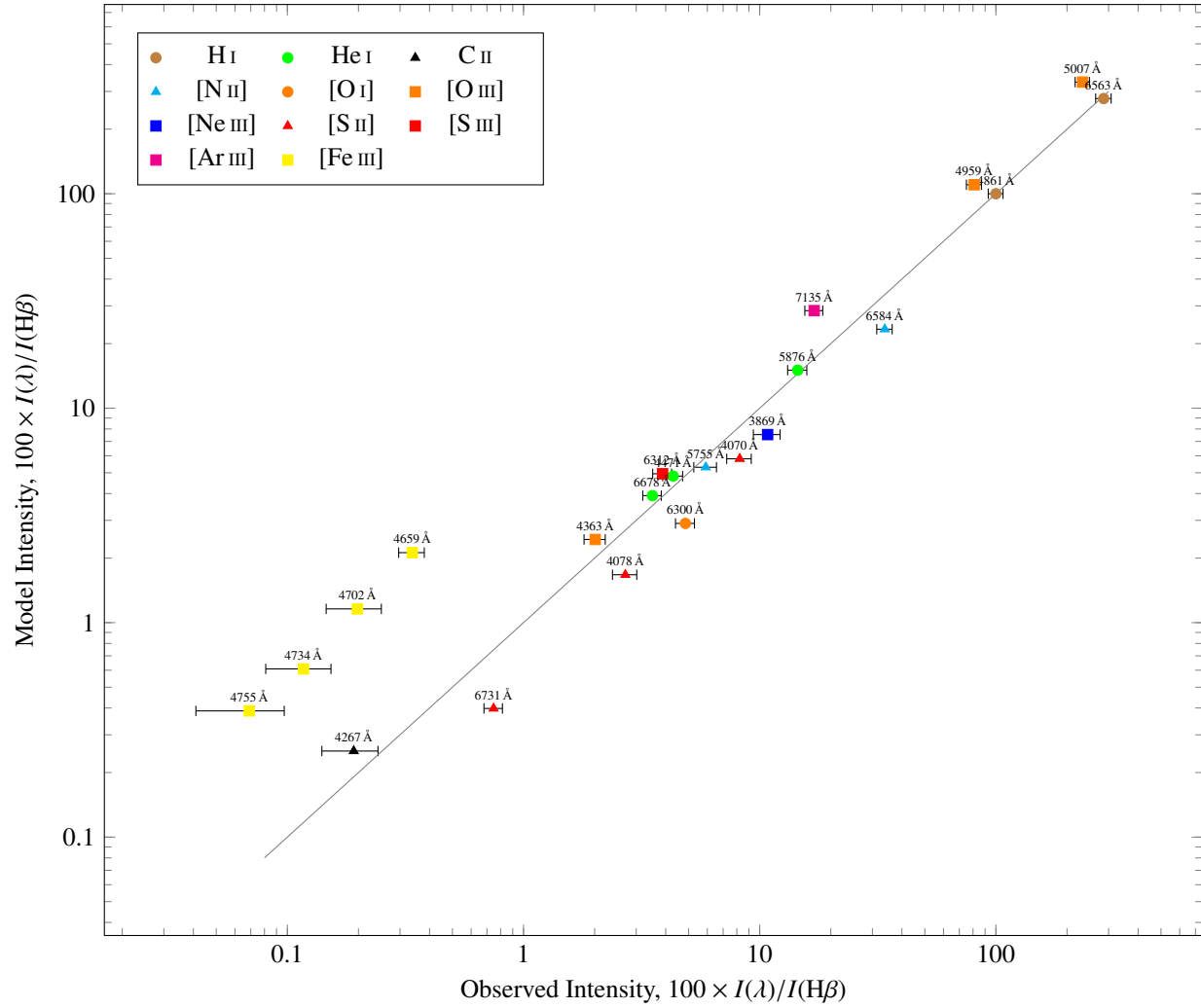
- This is all over the place. These abundances can definitely be ruled out.
- Iron, Sulphur, and Nitrogen are too weak
- Carbon is too strong, due to increased abundance
- However, Argon is much improved, as is [O I]
- The [O III] auroral/nebular ratio is still too small

## Model E: Tlusty atmosphere

**Spectrum** Tlusty, 39 000 K

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

**Abundance set** Cloudy Orion

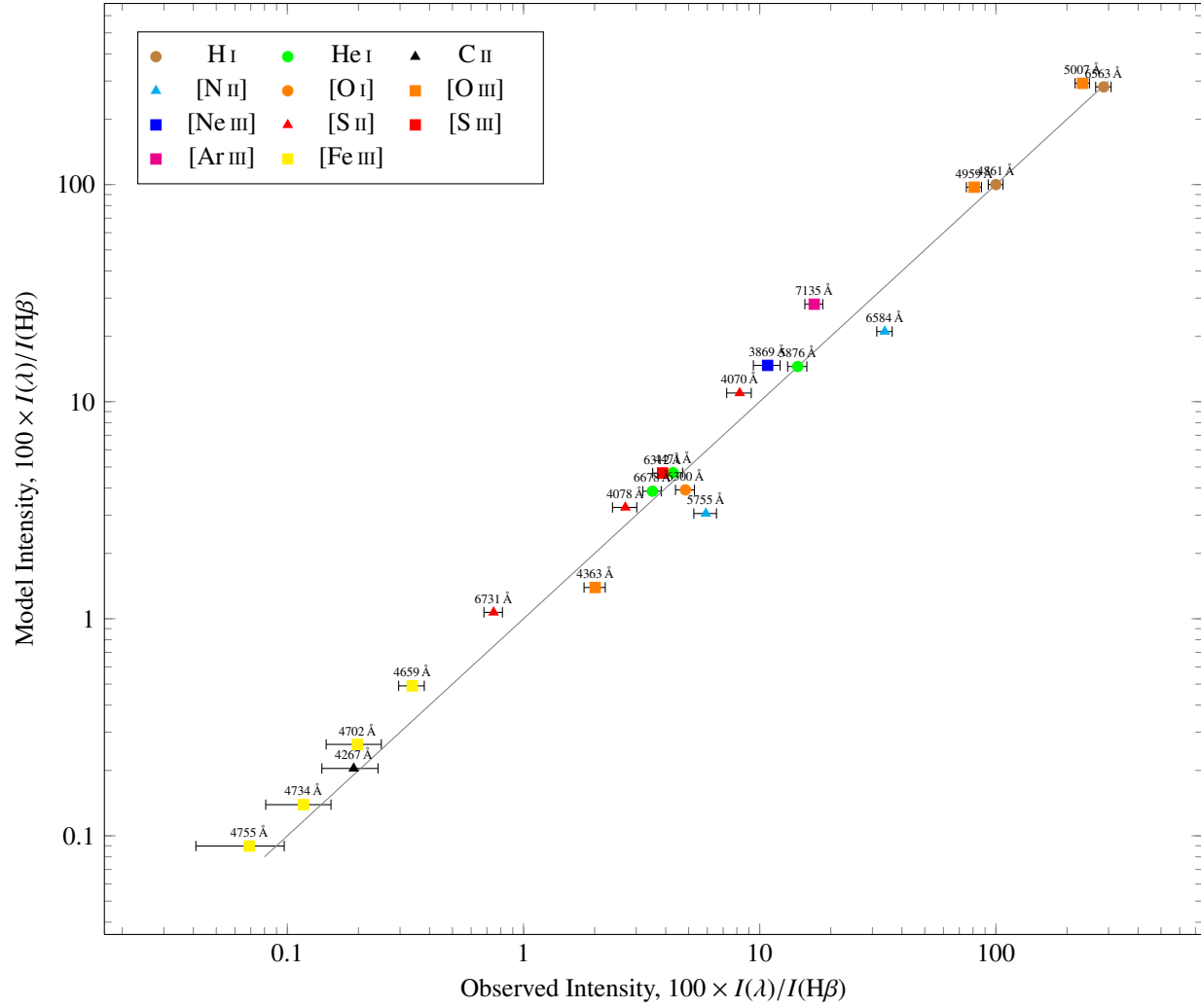


## Model F: Lower flux and Esteban

**Spectrum** WMBasic, 39 000 K

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

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

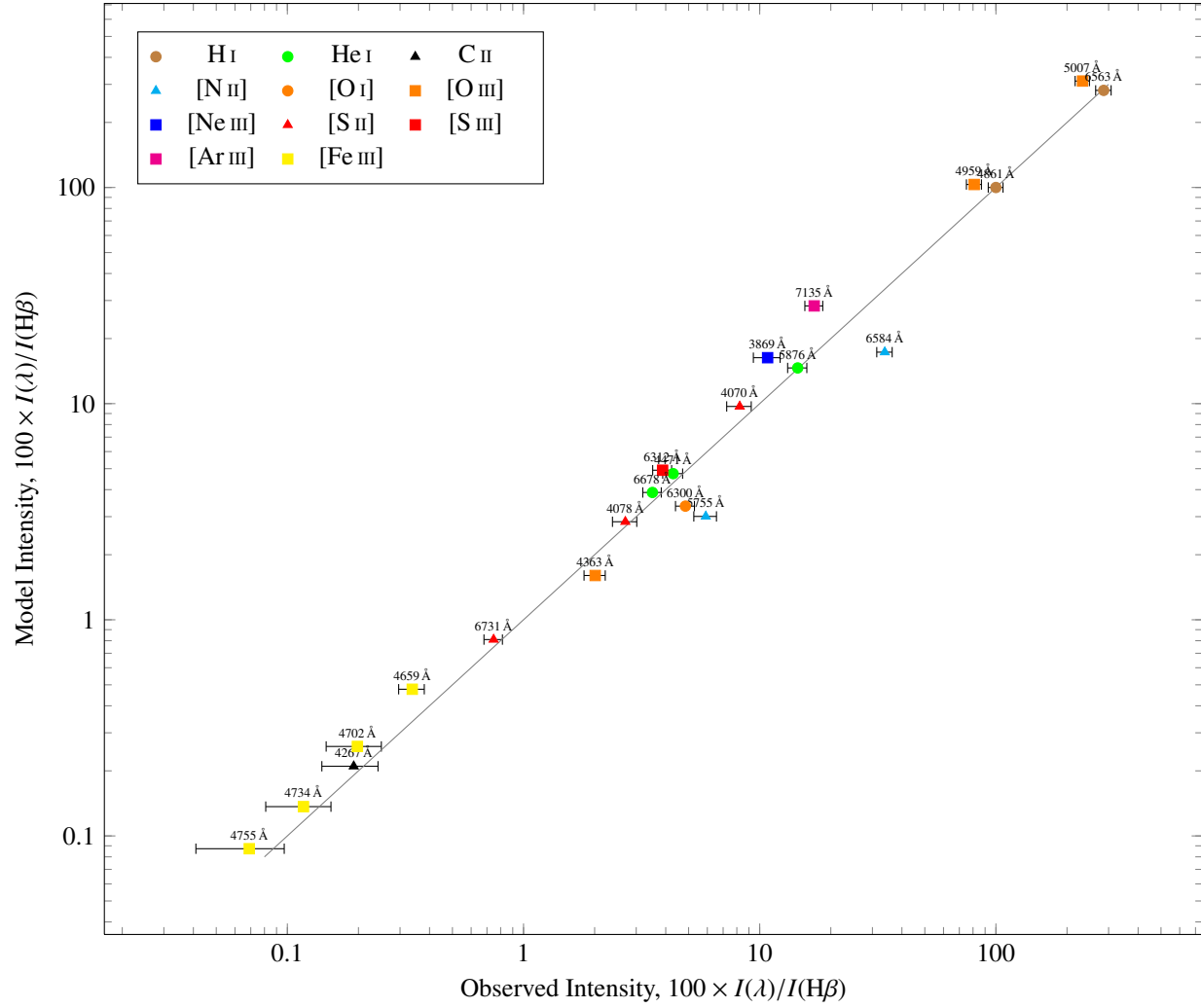


## Model G: Intermediate flux and Esteban

**Spectrum** WMBasic, 39 000 K

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

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

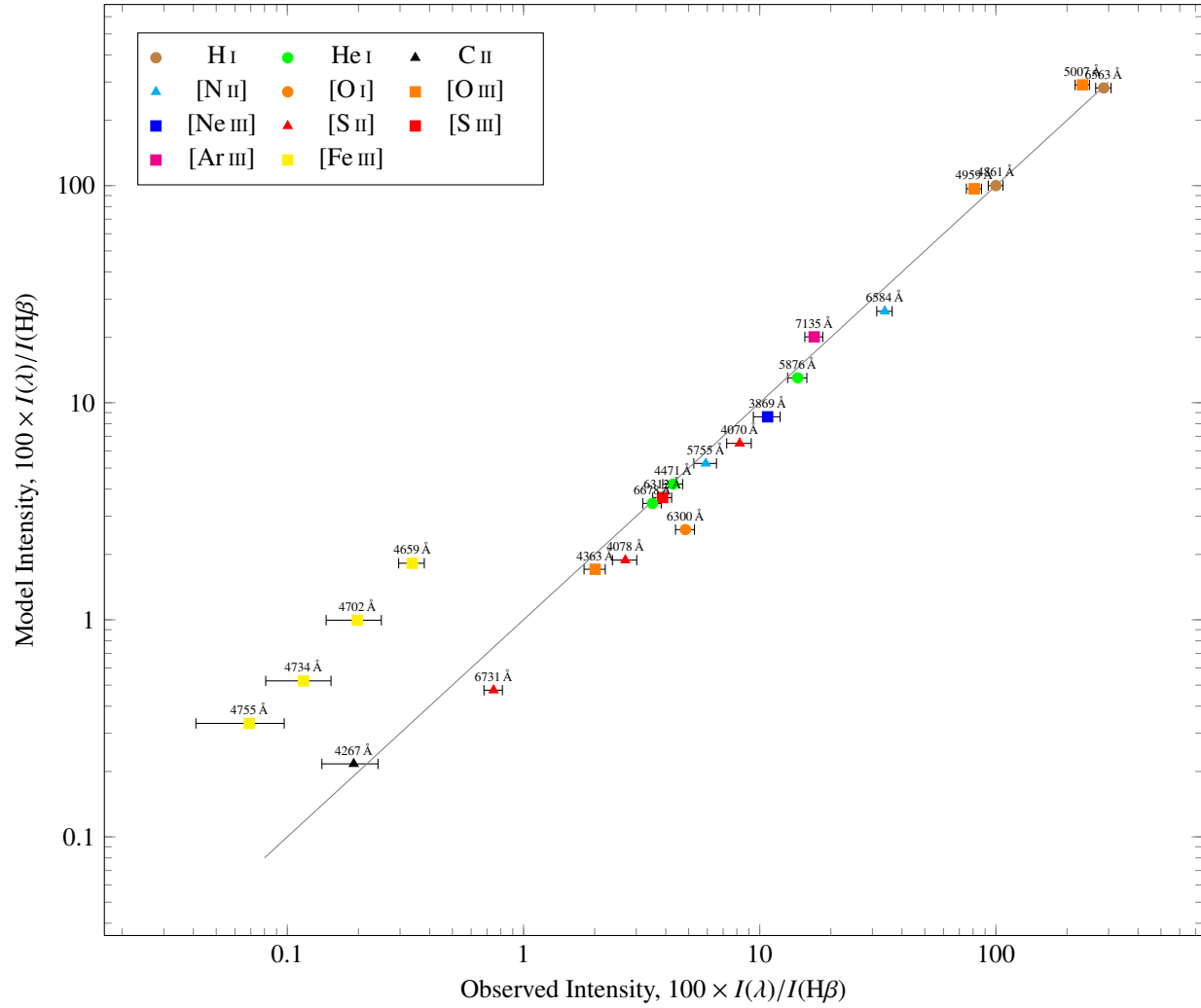


## Model H: Cooler star

**Spectrum** WMBasic, 38 000 K

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

**Abundance set** Cloudy Orion



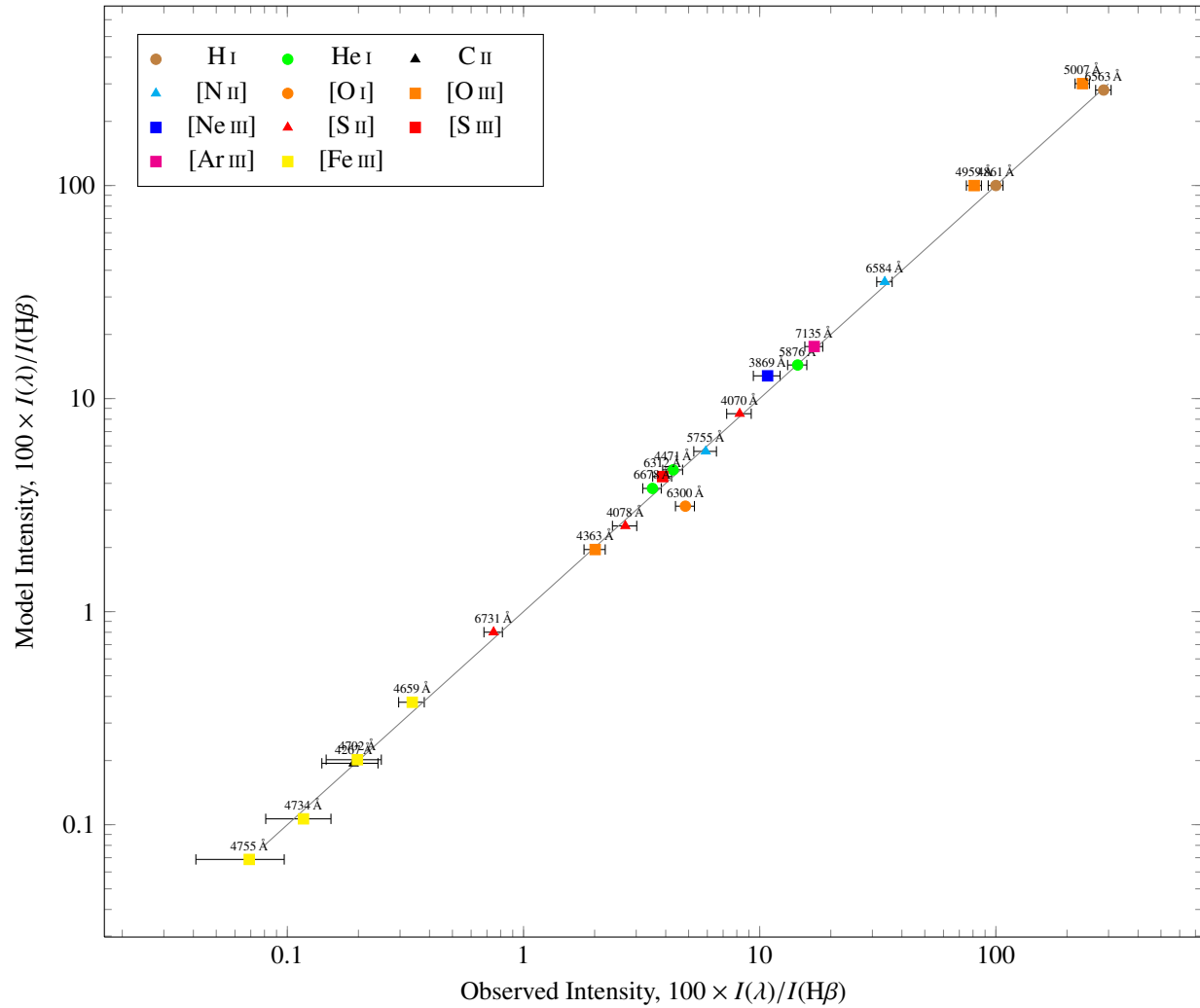


## Model I: Bespoke abundances and lower flux

**Spectrum** WMBasic, 39 000 K

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

**Abundance set** Tweak01



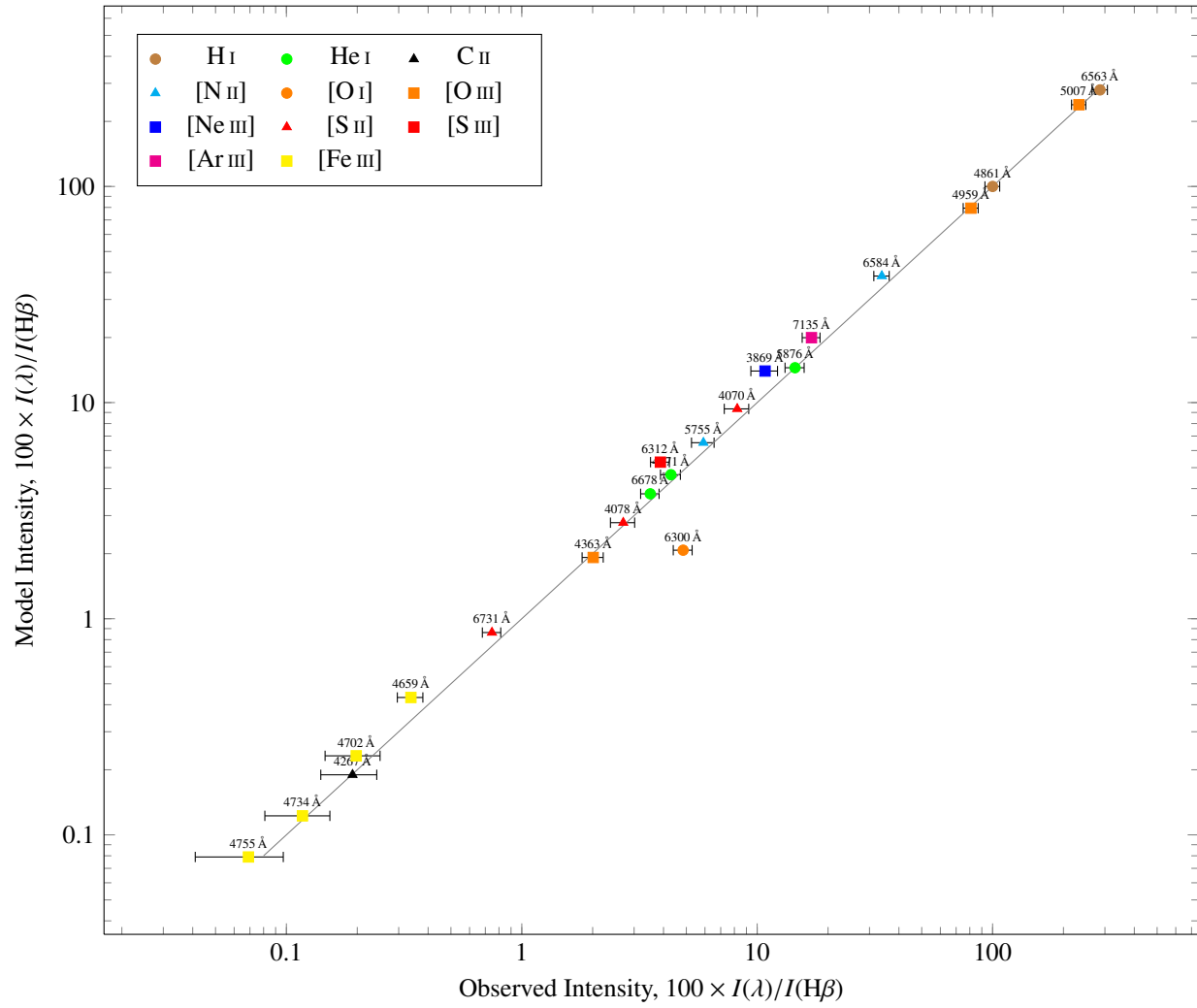
- This is the best one! Nearly everything is OK, except...
- ...the nebular [O III] lines are 20–30% too strong (about  $3\sigma$ )
- ...and [O I] is too weak, but that does not matter, since there will be a contribution from OH dissociation in the neutral disk wind, which is not include in the model

## Model J: Bespoke abundances (50% Oxygen) and lower flux

**Spectrum** WMBasic, 39 000 K

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

**Abundance set** Tweak02



## Model K: Further tweaked abundances (50% Oxygen) and lower flux

**Spectrum** WMBasic, 39 000 K

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

**Abundance set** Tweak03

