

# A High Resolution *H*- and *K*-Band Spectroscopic Sequence of Ultracool Dwarfs

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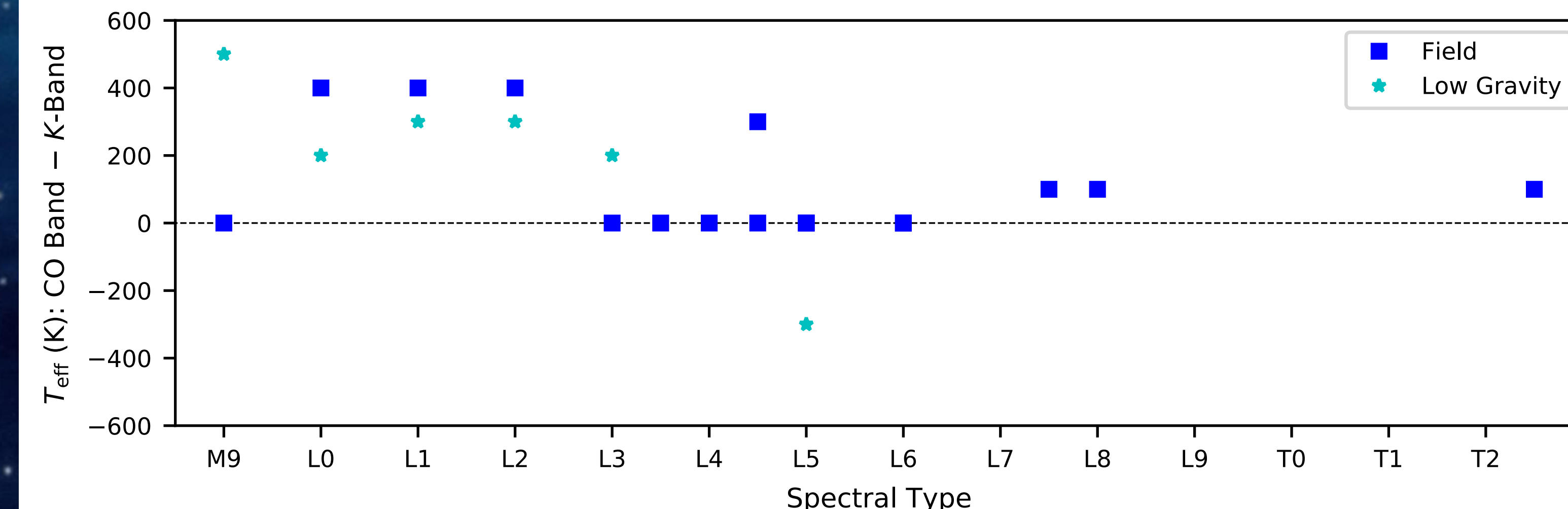
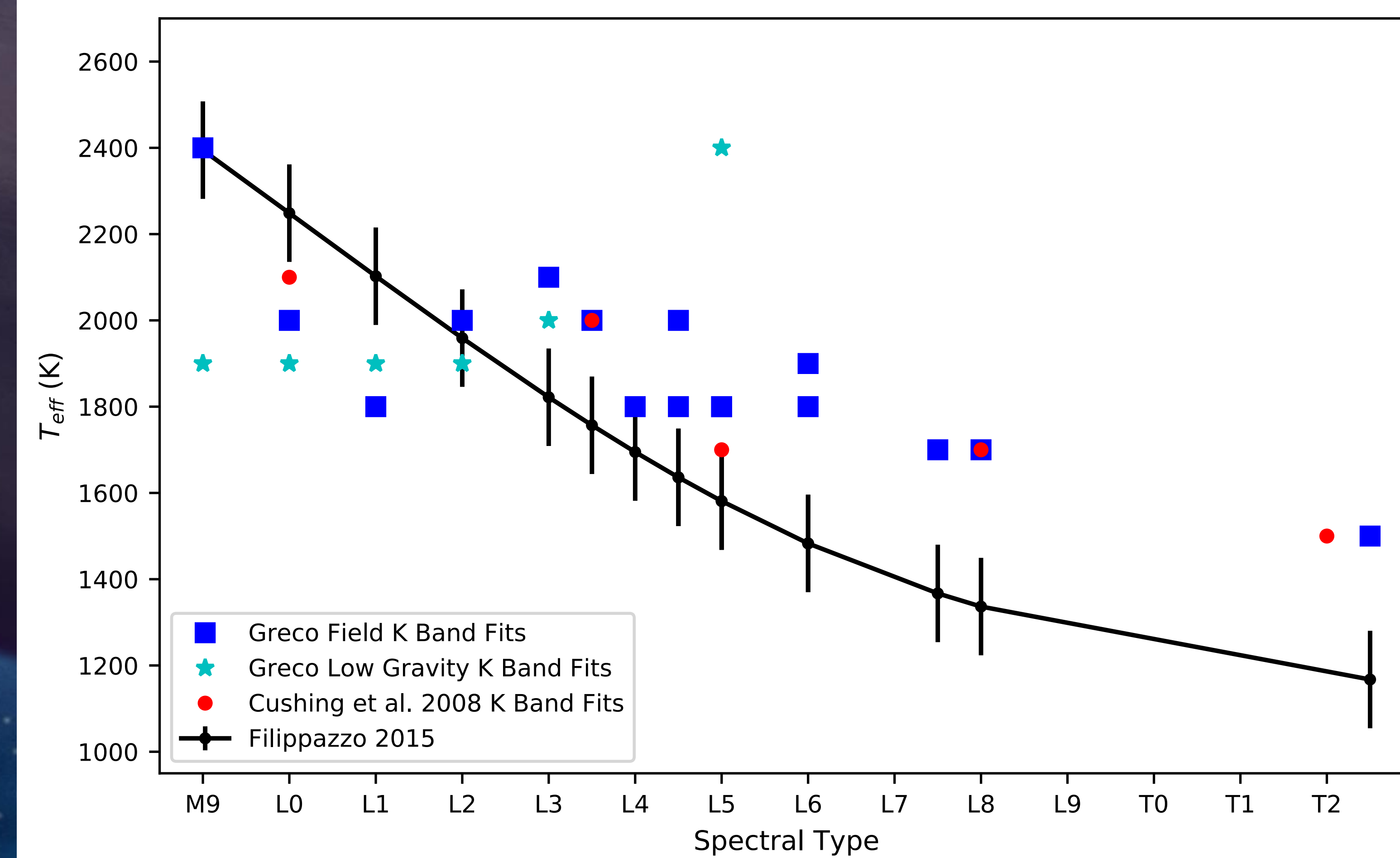
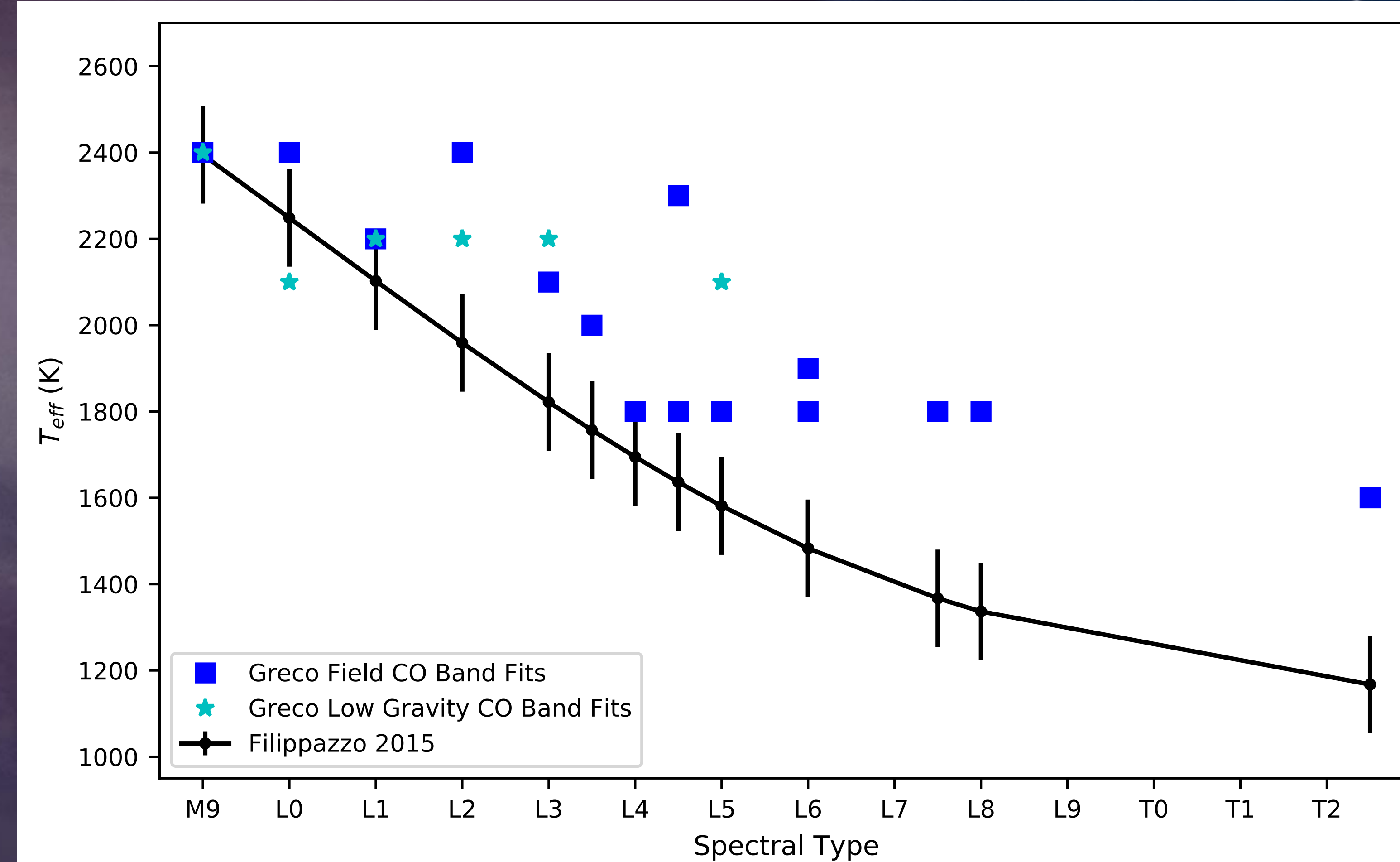
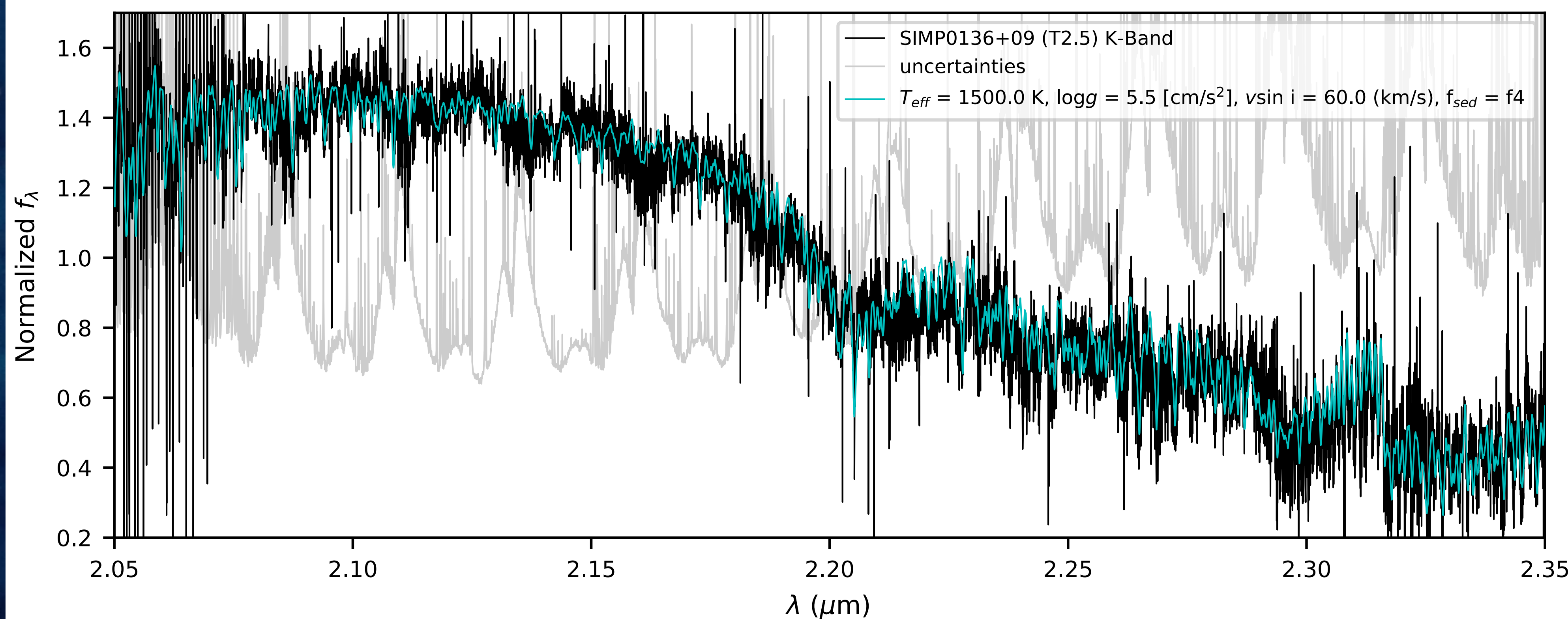
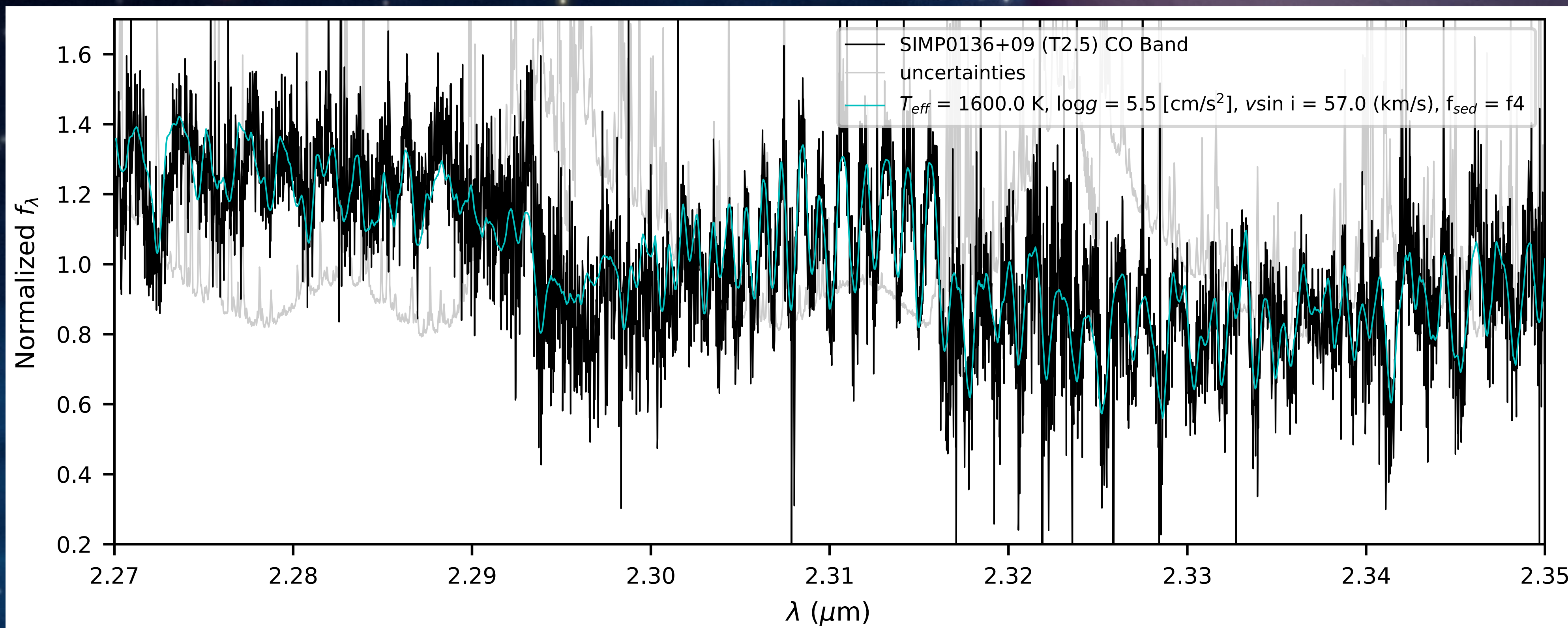


- Ultracool dwarfs have been studied extensively using photometry and low- and moderate-resolution spectroscopy, but rarely using high-resolution spectroscopy.
- We have assembled the first high-resolution *H*- and *K*-band spectroscopic sequence of ultracool dwarfs. Our sample contains 31 objects with spectral types ranging from M1.5V to T6, and also contains low-gravity objects at five spectral types (M9, L0, L1, L2, L3, L5).
- All spectra were obtained using the Immersion GRating INfrared Spectrometer (IGRINS) on the 4.3 meter Lowell Discovery Telescope at a resolving power of  $R \sim 45,000$ .



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- We compared 22 of our objects to synthetic spectra created from the atmospheric models of Saumon & Marley 2008.
- We fit both the whole *K*-band (2.05-2.35 $\mu\text{m}$ ) and the CO band (2.27-2.35 $\mu\text{m}$ ), to obtain estimates of  $T_{\text{eff}}$ ,  $\log g$ ,  $v \sin i$ ,  $f_{\text{sed}}$  for our objects.
- Shown here as an example are the CO band and *K*-band fits for the T2.5 dwarf SIMP0136+09. The best fitting model for each is shown in cyan.



- We find that our  $T_{\text{eff}}$  values (shown in blue) are high when compared to those calculated using photometry by Filippazzo et al 2015 (shown in black) but agree well with those found using the same models at moderate resolution by Cushing et al 2008 (shown in red).

- We also find that the  $T_{\text{eff}}$  values obtained in the CO band are all greater than or equal to those obtained in the *K*-band.
- We find similar systematic differences between the values of  $\log g$ ,  $v \sin i$ , and  $f_{\text{sed}}$  from the *K*-band and CO band fits (see online version of poster for more information).
- We are still investigating the cause of these systematic differences.

If you have any questions please email [jennifer.greco@physics.uu.se](mailto:jennifer.greco@physics.uu.se)