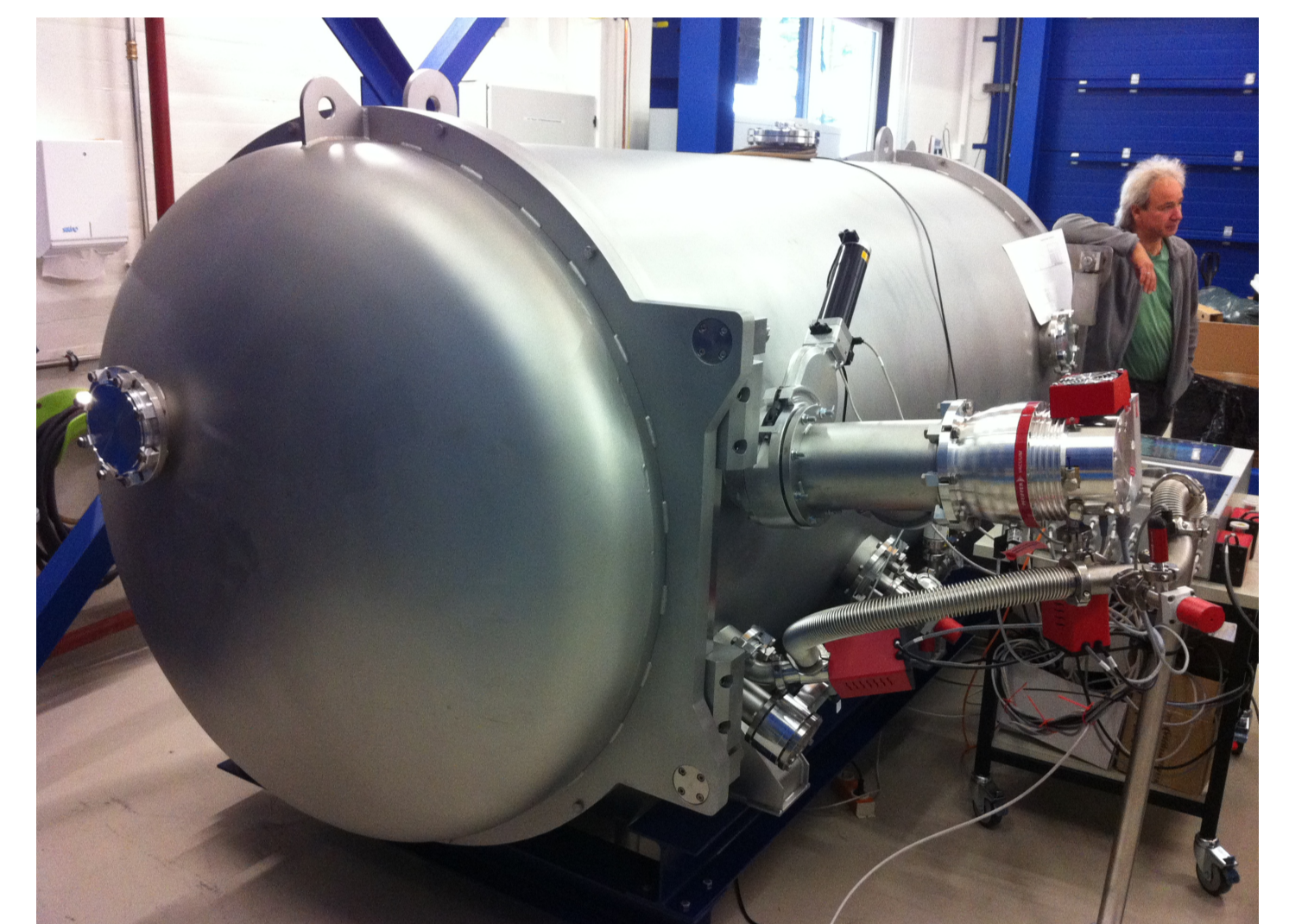# carmenes

# A new window into exoplanets and their stars

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http://carmenes.caha.es/

Abstract. Within the next year, the CARMENES project will start surveying 300+ low-mass stars to investigate their population of exoplanets. It will be the first instrument to collect time series of high-resolution spectra covering the wavelength range from visual to near-infrared (550-1700nm). The data will allow to find planets of only a few Earth-masses around stars in our immediate neighborhood. The unprecedented wavelength coverage and high data quality will provide information on fundamental stellar parameters, stellar activity, magnetic fields, and star-planet interactions. Extensive scientific activities are carried out in preparation of the CARMENES target sample.
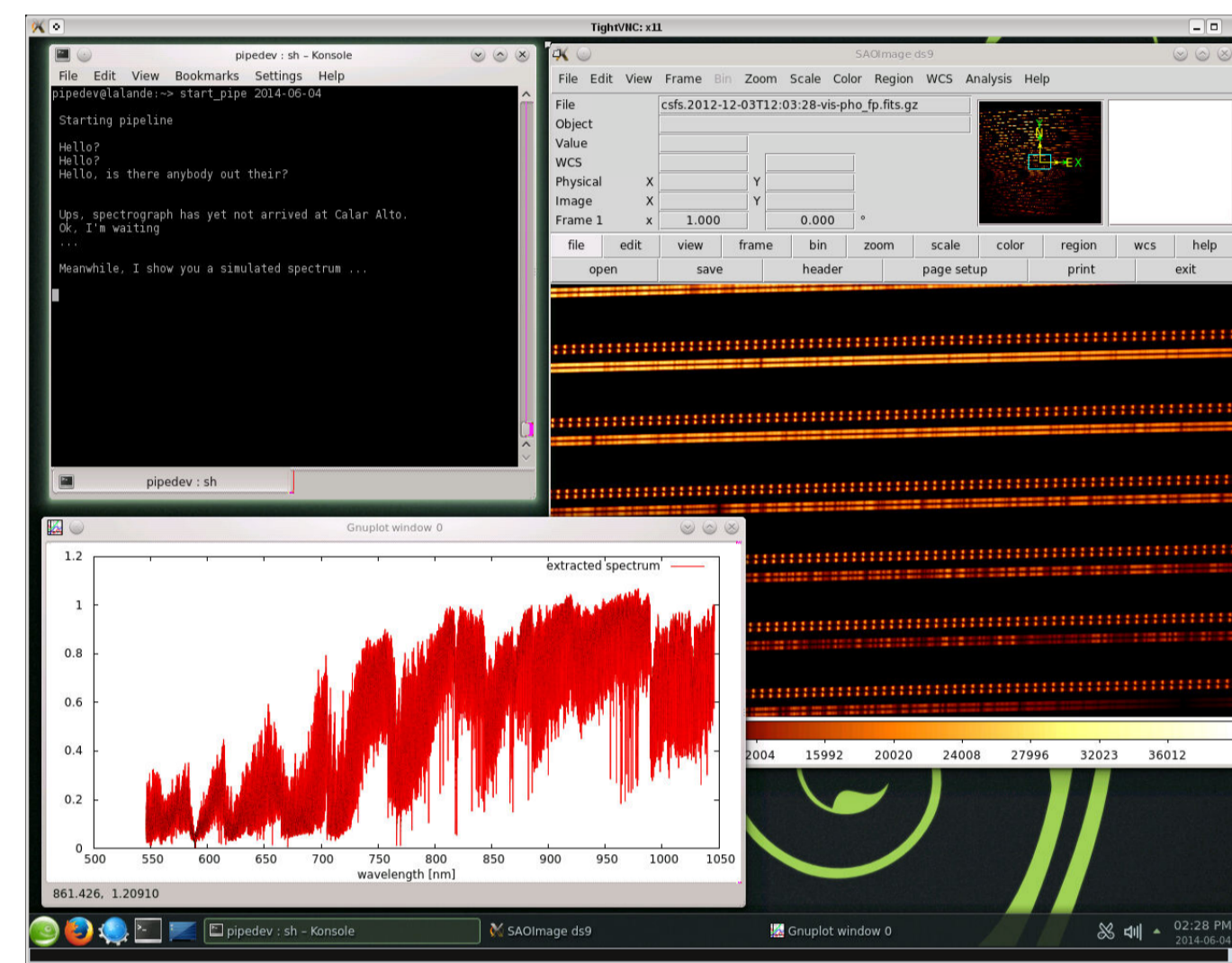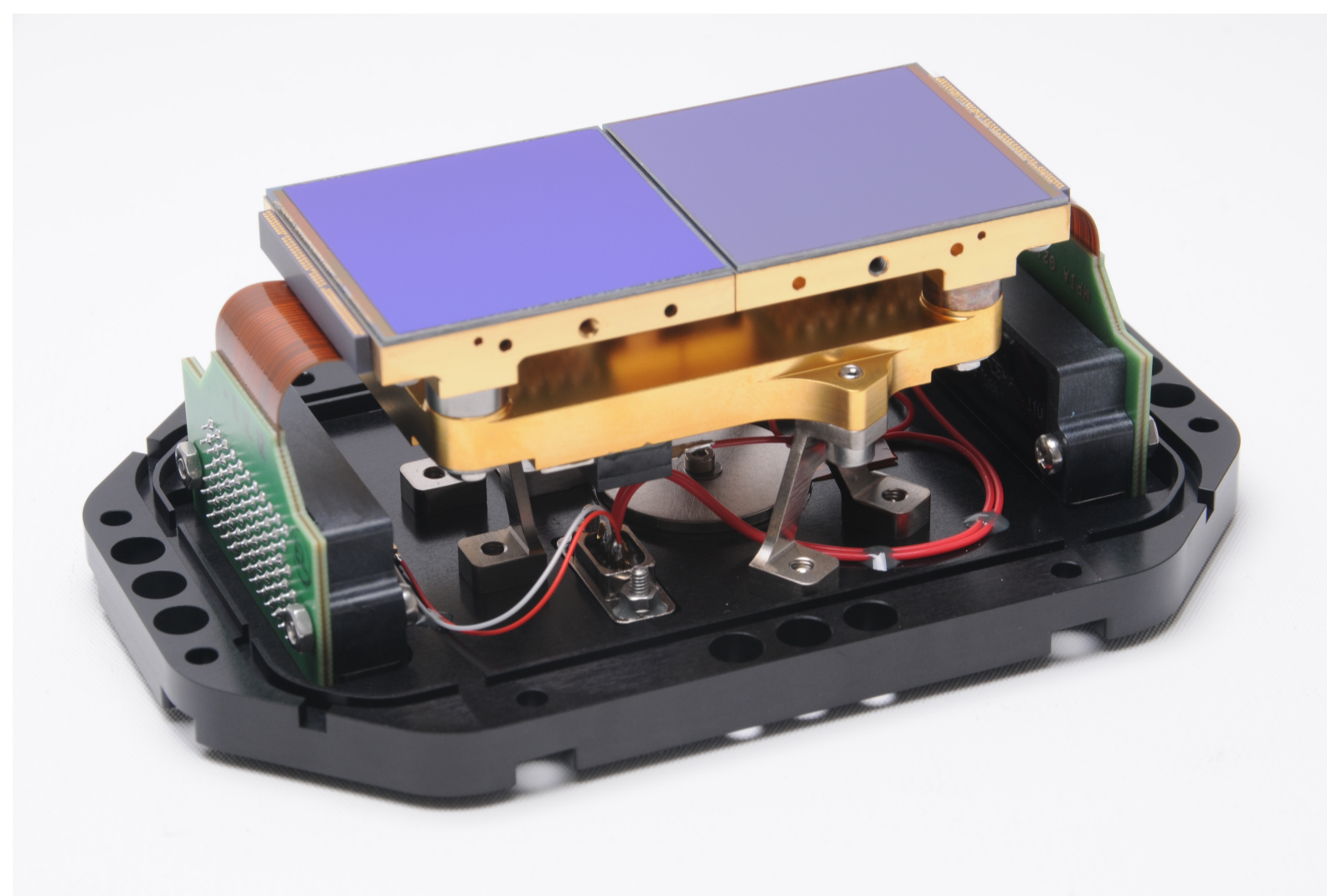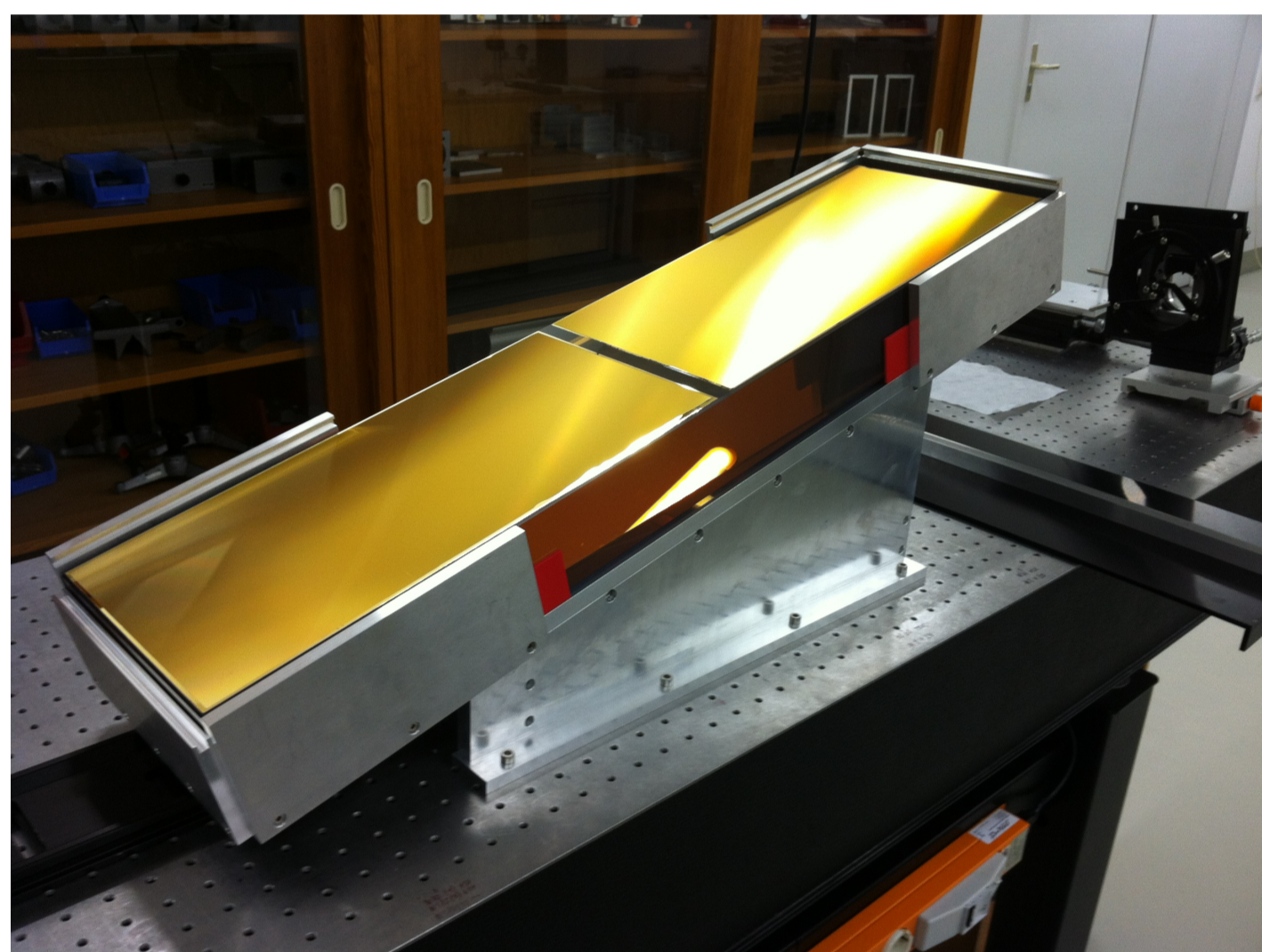
Status The two CARMENES instruments are being assembled 2014/2015 before shipping to Calar Alto observatory. The pictures above show from left to right: Echelle mosaic for the VIS spectrographs, NIR detector mosaic, CARMENES spectral format simulator and data reduction and analysis pipeline running at Calar Alto computers, VIS arm vacuum tank.

Science preparation The CARMENES survey will monitor ~300 low-mass stars for radial velocity variations. All stars are characterized before the survey to maximize scientific efficiency.

We are constructing a candidate sample that contains more than 1000 stars. For candidates stars, we determine spectral types, fundamental parameters, rotational velocities, and search for binary companions.

• So far, we carried out the following observations:

• Low-resolution spectroscopy: 800 observations of 760 stars with CAFOS, Calar Alto

• High-resolution spectroscopy: more than 400 observations with CAFE, FEROS, HET

• More than 100 stars with two or more epochs to look for binarity
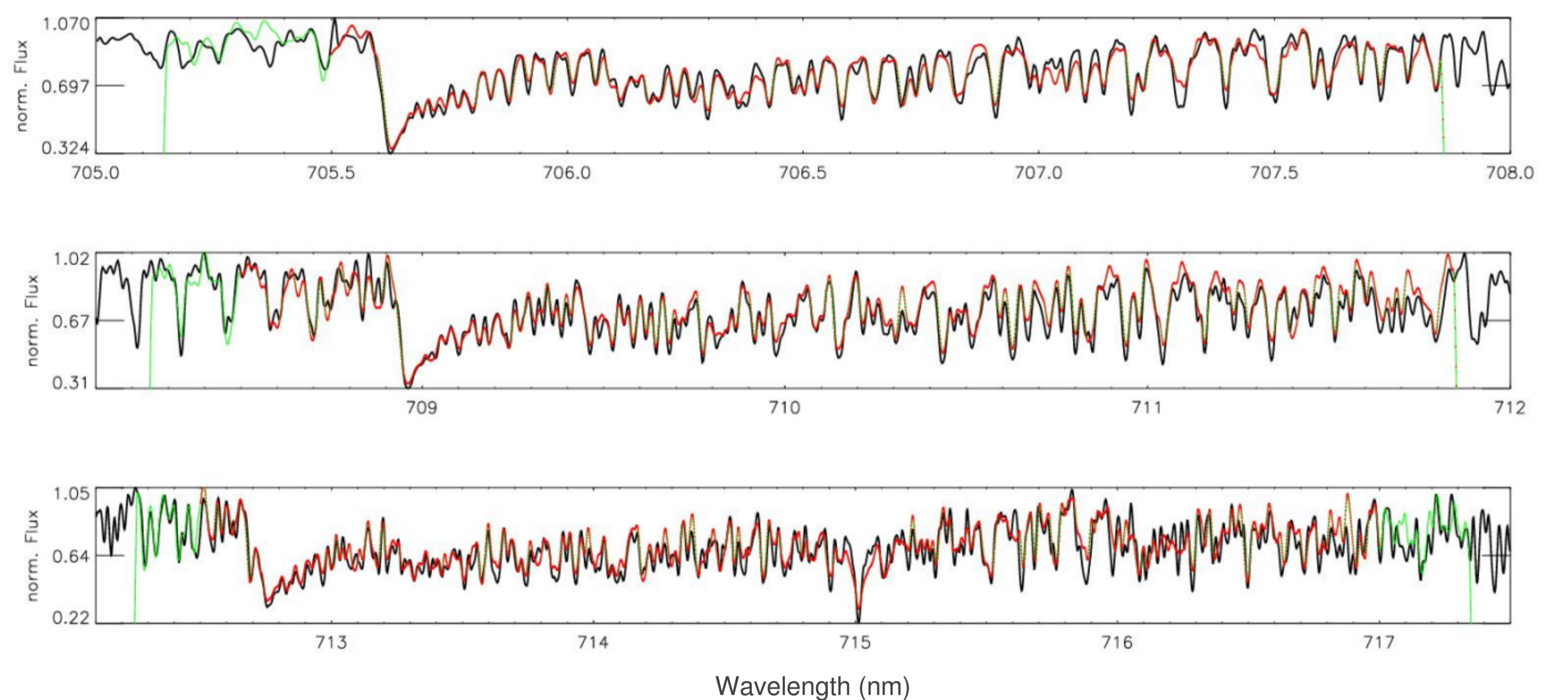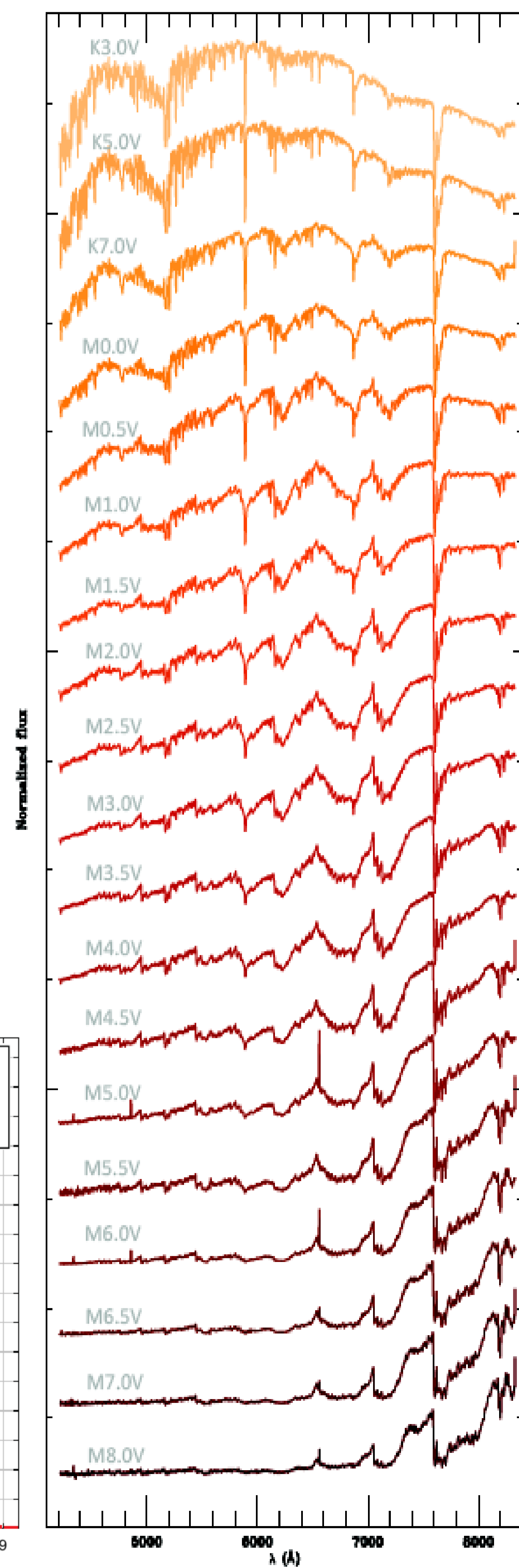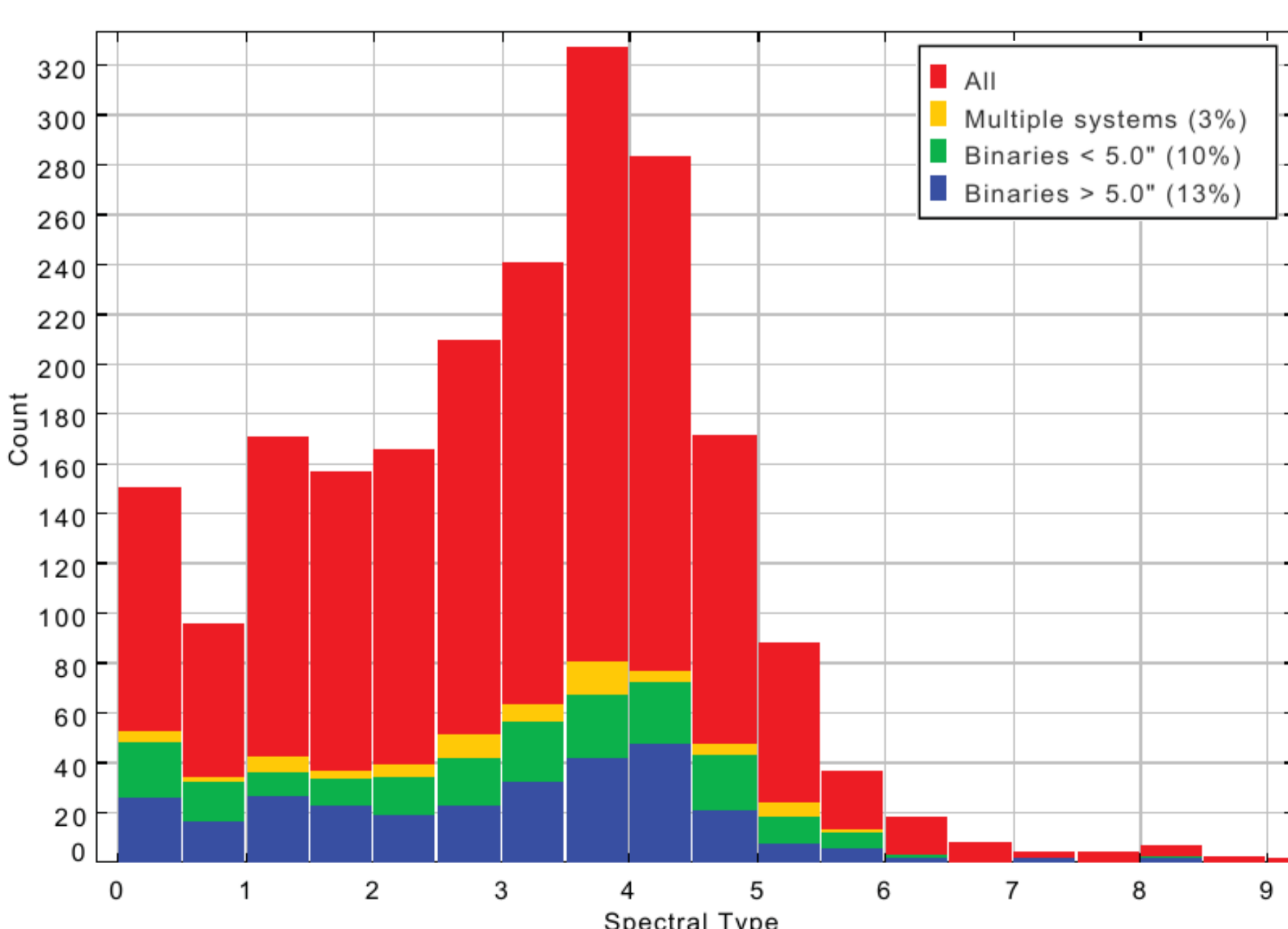
Stellar Parameters We compare our high-resolution spectra to state-of-the art PHOENIX models to determine temperature, gravity, rotation, and metallicity. The above figure shows a region of our spectra together with a model spectrum. *Black:* Data; *Red/Green:* Model spectra (the red region is used for fitting)
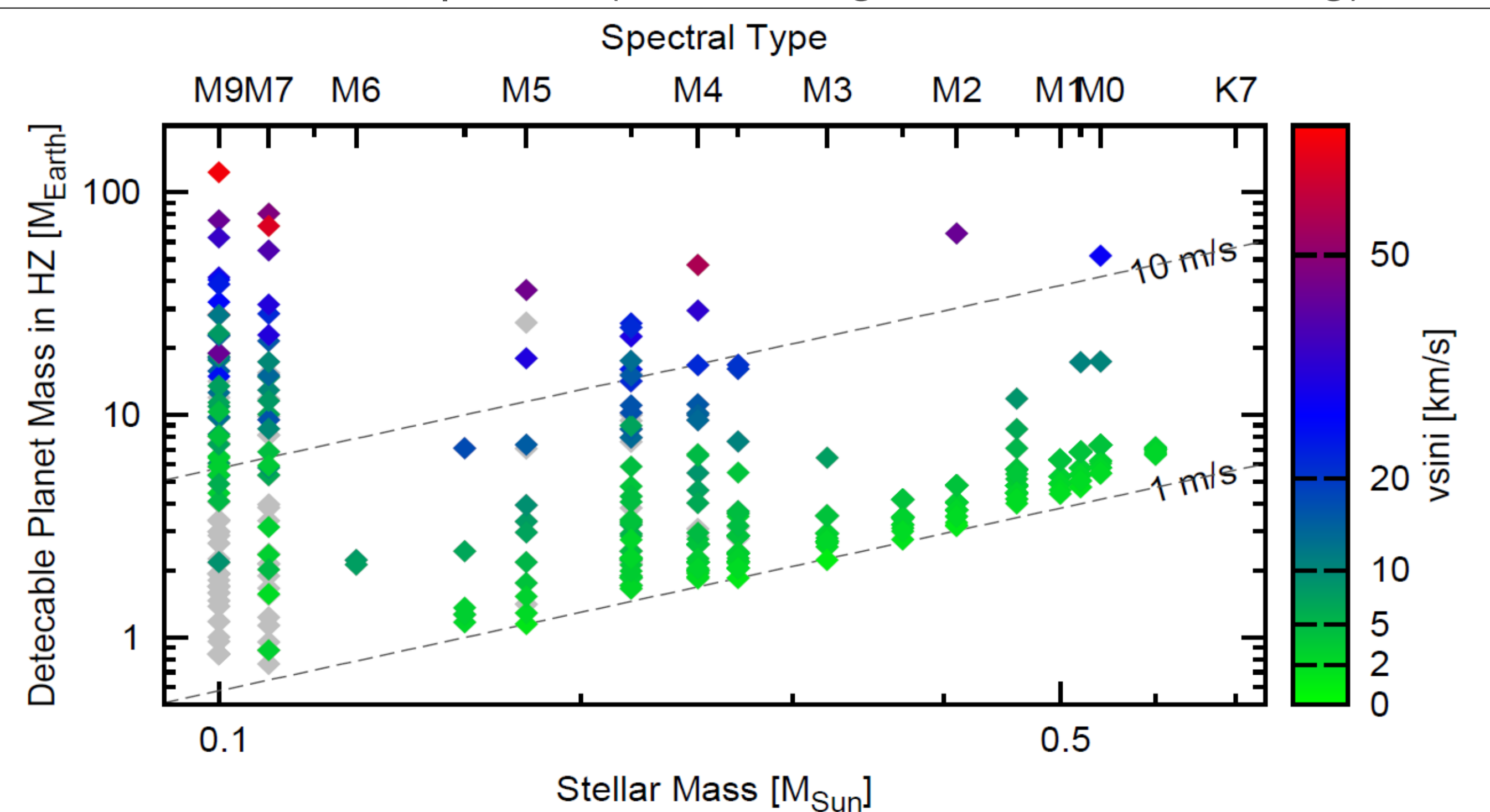
Precision estimate For all survey targets, we estimate the RV precision achievable from our survey and calculate the lowest-mass planet that would be detectable in the habitable zone of each star. The figure shows a subset of our candidate targets.