THE EFFECTS OF TELLURIC LINES IN RADIAL VELOCITY SEARCHES FOR PLANETS WITH IODINE CELL AS CALIBRATORS[1]

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ABSTRACT

Tellurics are bad and you really don't want them. Here's how to get rid of them.

Subject headings: instrumentation

1. INTRODUCTION

We are going to cite Artigau et al. (2014); Cunha et al. (2014) and Rothman et al. (2013).

2. DATA AND DATA ANALYSIS TOOLS

Introduction to Keck/HIRES CPS data, data reduction, Doppler code. Our adoption of Doppler code.

Introduction to the standard star(s) in this paper?

ZZZ Table: standard star stellar properties? esp. coordinates to highlight BC ranges?

3. EFFECTS OF TELLURIC LINES

3.1. *Simulated Data*

This is where TERRASPEC got introduced.

ZZZ Plots:

- telluric line atlas in the optical? just to demonstrate where they are.

- telluric free simulations to demonstrate RV precision, vs. year, vs. BC

- telluric injected simulations to demonstrate effects, vs. year, vs. BC

- RV vs. BC for chunks with and without telluric lines before and after injection

3.2. *On-Sky Data*

Should this be the first?

ZZZ Plots:

- RV vs. year/time, RV vs. BC

- RV from chunks with and without telluric lines, vs. BC

3.3. *Where and How Telluric Lines Enter the Data*

Should this subsection be moved to the first? It enters the epoch data as well as the empirically derived stellar template.

ZZZ Plots:

- fitting plots showing data (with telluric highlighted) and DSST (tellurics highlighted) and the mismatch

4. CORRECTING FOR THE EFFECTS OF TELLURIC LINES

4.1. *Masking out the Telluric Lines*

ZZZ Plot:

- Illustration of choice of mask

- RV vs. BC before and after for all, telluric, and non-telluric chunks

- simulation results showing no aliases introduced by masking

4.2. *Removing the Telluric Contamination from Stellar Templates*

ZZZ Plot:

- selected chunk before and after cleaning

- ?RV vs. BC using cleaned template, no masking, single mask?, double mask?

4.3. *Modeling Telluric Lines in the Star+Iodine Spectra*

ZZZ Plot:

- RV vs. BC using cleaned template plus full telluric modeling

- RV vs. BC using cleaned template plus full modeling plus some masking?

4.4. *Results for A Different RV Standard Star*

I think this is a must! At least one more star, hopefully two.

5. SUMMARY AND FUTURE WORK

Gaussian processes!

REFERENCES

Artigau, É., Astudillo-Defru, N., Delfosse, X., et al. 2014, in Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, Vol. 9149, Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series, 5

Cunha, D., Santos, N. C., Figueira, P., et al. 2014, A&A, 568, A35

Rothman, L. S., Gordon, I. E., Babikov, Y., et al. 2013, J. Quant. Spec. Radiat. Transf., 130, 4