General Notes

The goal of the project is to get an understanding of the current state of the field on mitigating stellar signals and give advice for future areas to explore. If there is anything from EXPRES that would be help, just let us know! This includes information, data types, or data sets.

It was suggested that there may be ideal data sets to serve as tests, covering such parameters as having known planets, different spectral types, etc. This can be kept an open discussion. If anyone has any suggestions, we would love to hear them!

We will start a slack channel to keep discussion open about this project. You can, of course, still always reach me by email, but this workspace will also be a good place to ask questions of me and other participants, discussion potential collaborations, etc. The invite is below.

The website describing the project and the data is pinned to the general channel in the slack.

Data Notes

The times given in the activity file (associated with the RVs and activity indicators) are barycentric corrected, photon-weighted midpoint times. They are in MJD-40000.

Between instrument epoch 4 (Feb. 10 2019 - Aug. 4 2019) and epoch 5 (Aug. 5 2019 - now), the LFC was serviced. There were no other changes to EXPRES the instrument like opening the chamber or anything like that. For the LFC, we replaced the photonic crystal fiber and changed the polarization of the light. This made the LFC more stable and also changed the wavelength range of the LFC redwards. We don't expect large RV offsets due to this change since it was only the wavelength calibrator that changed.

We will work to provide stitched spectra within the next week. Our order stitching is done using a python implementation of a B spline. We will provide the parameters of this B spline to allow for infinite sampling and also the data interpolated onto a log wavelength scale matched to the physical wavelength spacing of the spectrograph.

The forward-modeling RV code (CBC) uses the barycentric corrected excalibur wavelengths ("bary_excalibur"). Excalibur uses only LFC lines and the CBC code only uses orders covered with LFC lines (relative orders 42-74).

CCF Notes

The CCF is also done in the barycentric frame. The analysis uses the chromatically corrected barycentric wavelengths ("bary_wavelength") from the extracted data. Note, this also uses the polynomial-constructed wavelengths using both ThAr and LFC lines.

The velocity spacing of the CCF is decided by the average wavelength spacing between pixels (which is why it can be very slightly different between exposures). It is approximately half a pixel (velocity grid is something like 200 m/s on average and each pixel is about 500 m/s)

The EXPRES CCF is nothing fancy. We encourage other teams to construct their on CCFs and discuss any improvements on the slack. To allow for standard comparisons, analyses should be done using the provided CCF and updated CCFs. If something is found to be uniformly better for HD 101501, we may release the better CCF for the remaining data sets.

Project Notes

We ask for several data products to allow for a consistent benchmark of all methods. This method will to first order be based on just the RMS of the RVs returned. We will also look at prominent periodicities in the cleaned, activity-less RVs (and also the "dirty" more activity-sensitive RVs if those are available), and any used activity indicators.

To keep these comparisons consistent, all the analysis will be done in house at Yale. Teams should provide final RVs and any indicators used to make this possible.