Photo-evaporative Atmospheric Escape Across Parameter Space

PI: Eric Lopez (693).
Collaborator: Kevin France (University of Colorado, Boulder)

Duration of Award:
FY18 (6m) – FY20

Main objectives

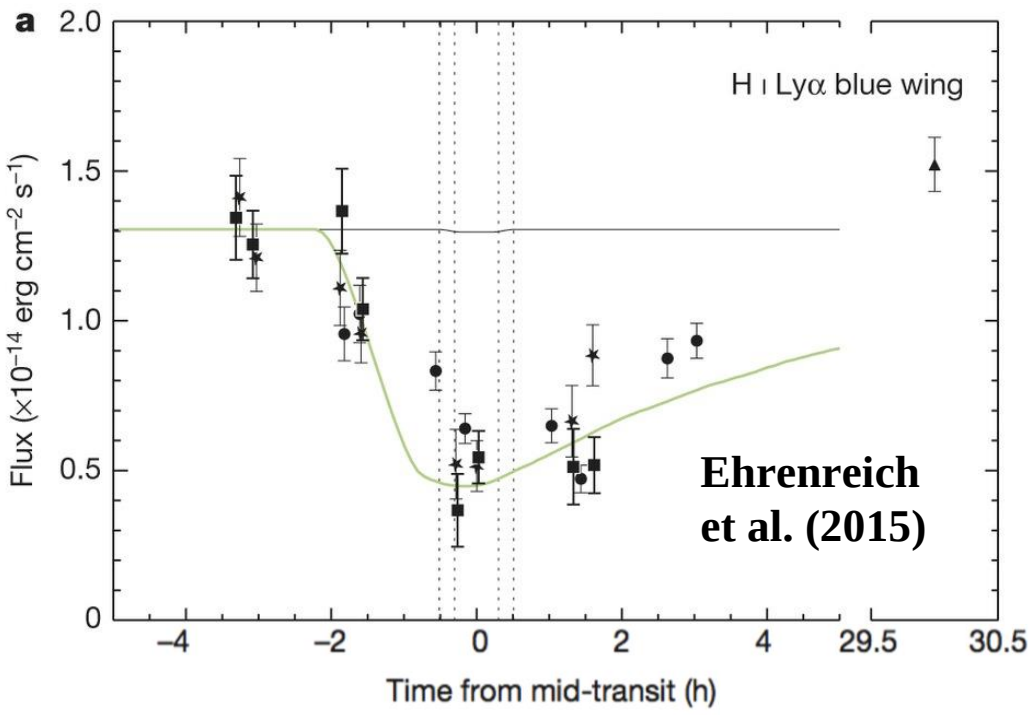
*** Develop new model of photo-evaporative atmospheric escape for highly-irradiated exoplanets using the radiative transfer code CLOUDY**

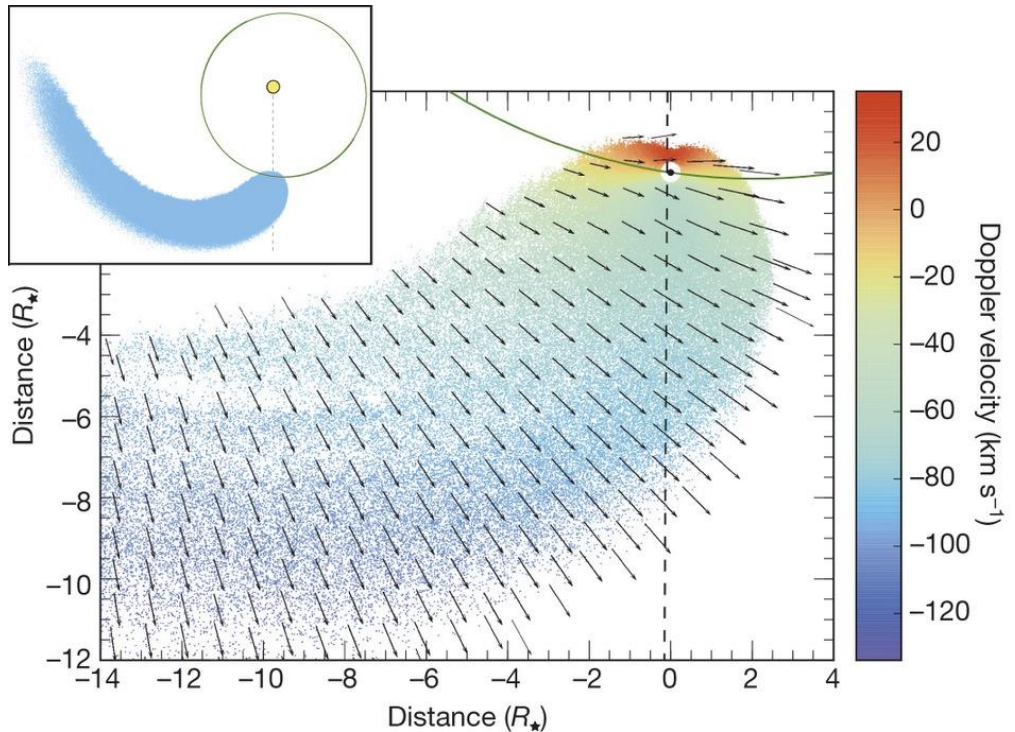
*** Predict escape rates across exoplanet parameter space, especially for metal-rich atmospheres.**

*** Provide pre-computed grids of escape rates to the community through EMAC**

*** Examine the future detectability of exospheric metals with space-based UV transmission spectroscopy**

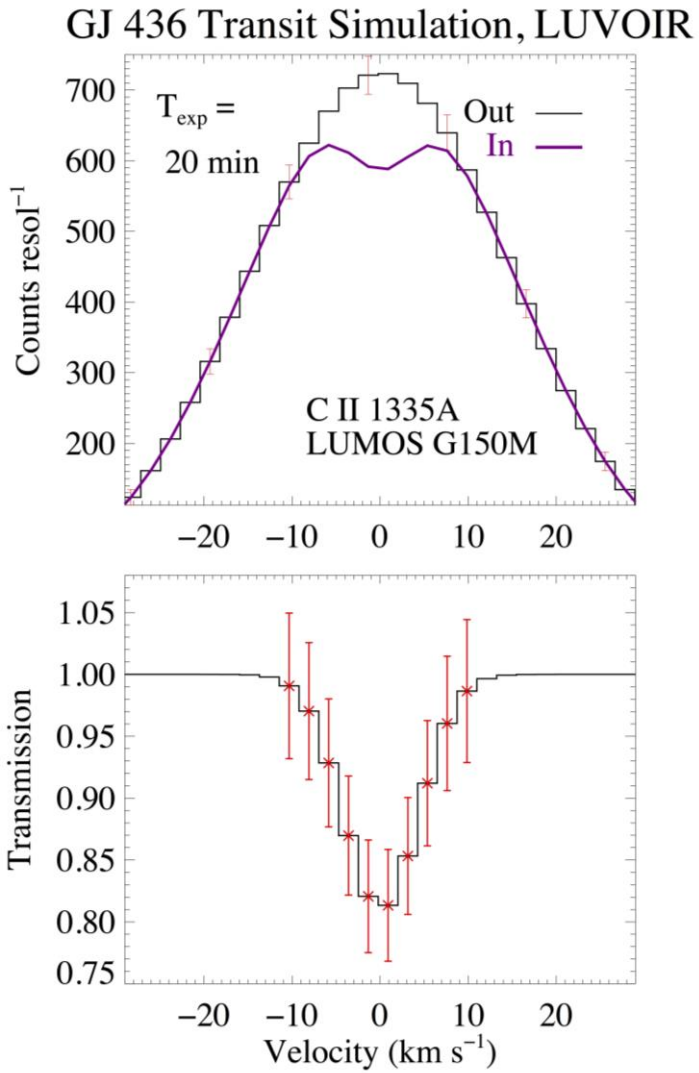
GJ 436b Exosphere Transit in Lyα from HST

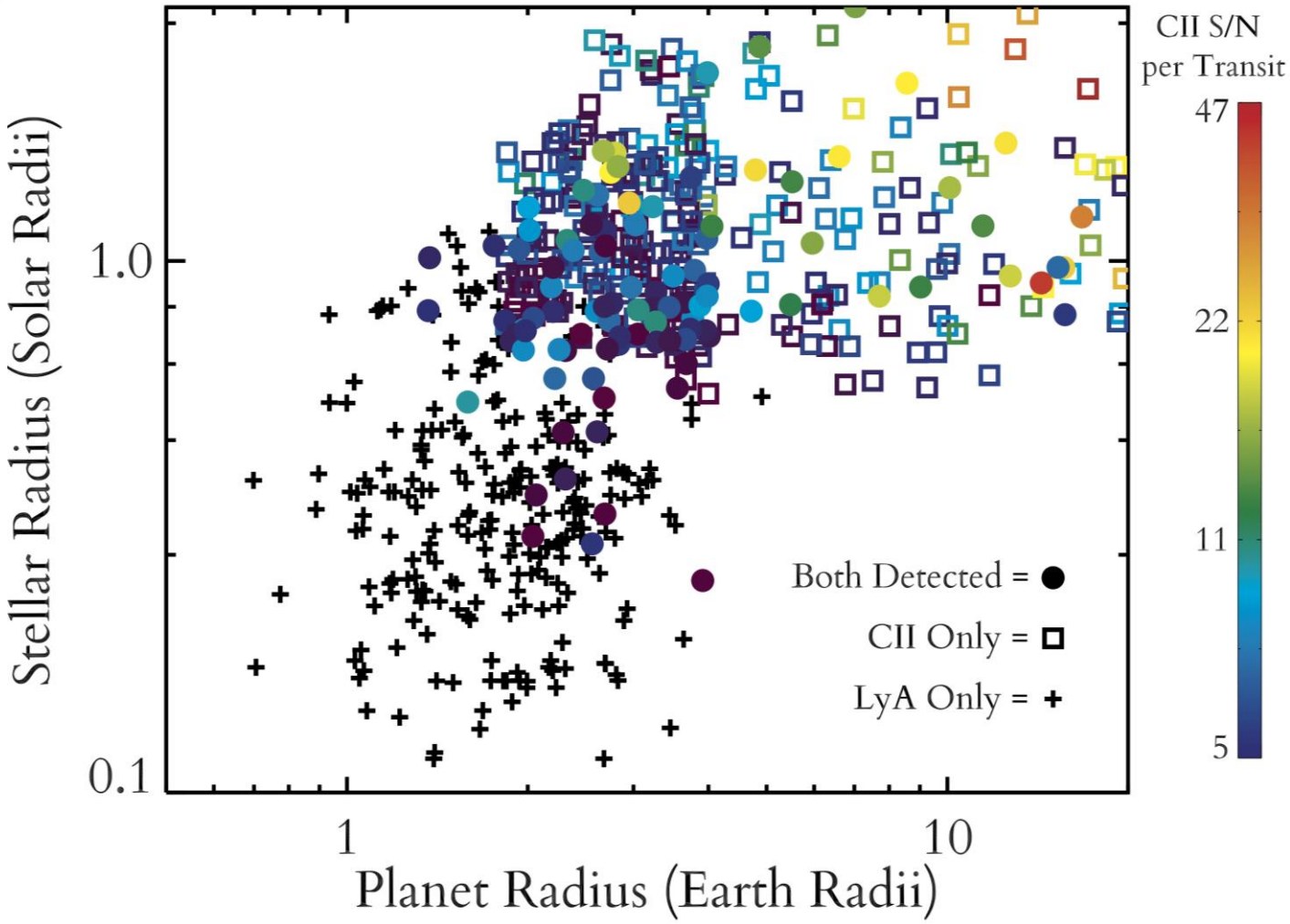




Initial Results in the first 6 months of study

- Initial results for obtained assuming Parker Wind density profile for GJ 436b, with CLOUDY used to calculate ionization balance.
- Transits then simulated in Lyα and CII at 133nm.





Metrics Delivered

- Estimated number of proposals not submitted to ROSES (1)
- New Collaborations with Kevin France (University of Colorado, Boulder) and Ruth Murray-Clay (University of California, Santa Cruz)
- Model outputs will provide key inputs for other ISFMs on atmospheric escape (including those lead by PI Airepetian and PI Lee)

Next Steps

- Further develop photo-evaporative escape models to be fully self consistent across parameter space then validate and publish.
- Provide a grid of pre-computed escape rates to other SEEC researchers working on escape and to the community via the Exoplanet Modeling Analysis Center EMAC.
- Use model outputs to examine the detectability of a wide range of atomic species in exoplanetary exospheres with UV transmission spectroscopy and make predictions for UV space telescopes including HST, HabEx, and LUVOIR.