Modular Spectral Inference Framework Applied to Young Stars and Brown Dwarfs

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Perfect Synthetic Spectral Models

If synthetic spectral models were perfect, we could use forward modeling and statistical inference to derive accurate stellar parameters for a given observed spectrum.

- data spectrum $D$
- model spectrum $M$
- stellar parameters $\theta$

The model spectrum might be hard to compute, and so you could emulate a grid of precomputed spectra, and track uncertainty.

- spectral emulation weights $w$
- precomputed model grid $\Xi$
- covariance matrix $\phi_w$

Imperfect Synthetic Spectral Models

In practice, synthetic spectral models are imperfect, causing inaccurate estimates of stellar parameters. Czekala and collaborators (2015) recently introduced the spectral inference framework Starfish robust against some common model imperfections.

- spectrograph resolution $\theta_{\text{obs}}$
- wavelength dependent slit losses $\phi_s$

The combination of inference with the new Marley et al. models applied to IGRINS spectra will be transformative to accurate fundamental parameter estimation and improvement of atmospheric models for JWST.

Figure: Spectral line or bandhead outlier rejection can be built into the Starfish covariance matrix. IGRINS data will provide exceptional feedback to models.

Immerion Grating Infrared Spectrograph (IGRINS)

IGRINS provides $R=45,000$ spectral resolution across the entire H- and K- near IR windows in a single shot. Its high spectral grasp and high efficiency stem from a custom Silicon Immersion Grating (Gully-Santiago et al. 2012) and VPH cross dispersers. The instrument is currently on the Discovery Channel Telescope, but will move to Gemini South starting in April 2018.

What's new at K2 GO office

Guest Observer (GO) Cycle 6 proposals are due by October 12.

- New: Tutorials for data mining K2 metadata
- New: Fine Guidance Star (FGS) data on MAST
- Updated: PyKE is now pyraf-free; python, CLI, and API
- Experimental: Supernova lightcurves from difference imaging
- Tools from PSF photometry adapted from FFIs

Coming soon:

- Podcasts and screencasts