RX J1852.3-3700

MAIN PROPERTIES AND LINE FLUXES

- RX J1852.3-3700 has an optically thick dust disk with an inner hole larger than that of the other 6 FEPS optically thick disks (see Fig. 3). This suggests that RX J1852.3-3700 is a "transition disk".
- At 1.27′ NW there is a A8/A9V star HD 174449 (V=9.5 mag). Only 1 ref. from Simbad: "Michigan Catalogue of HD stars, Vol.3 (Houk, 1982)" from which we have the SpTy. If HD 174449 is also at 130 pc then d(RXJ1852.3)$\geq$ 9900 AU. No other brighter sources nearby.
- There are no UV data from the IUE nor from the GALEX archive for the source RX J1852.3-3700 .
- IRS spectra. We have a [NeII] line detection at 12.81 micron (see Fig. 1). There are no other gas lines in the spectrum (maybe there is a [NeIII] in the middle of order SH/13, but that is really at the 2σ level, see Fig. 2). Note that the LH has low S/N, we asked for longer exposures. IP and DW agree within 1% in [NeII] line Flux: 0.475 [mJy$\times$micron] (DW) and 0.471 [mJy$\times$micron] (IP). IP and DW agree that the emission is only on-source. No line emission on the offset, sky position.
- There is a small bump in the low-res at the 12.81 micron resembling the emission seen in the SH when smoothed at the same resolution of the low-res. The low- and high-res spectra were obtained in different campaigns.
- The flux in the [NeII] line and upper limits to other atomic IR lines are given in Table 3.
- The optical spectrum shows a broad Hα emission line, characteristic of CTTS.
- There are also two [OI] lines at 6302.046 and 6365.536 Å. How good is the wavelength calibration of the optical spectrum?
- X-ray data are from the ROSAT All-Sky Survey (RASS young sources around R CrA, Neuhaeuser et al. 2000). Hardness ratios : HR1(0.5-0.9 keV)=0.9$\pm$0.13, HR2(0.9-2.0 keV)=0.54$\pm$0.25 (softer spectrum).

Questions

- Is the [NeII] emission originating from the disk? Or could it be from a wind or from a jet/outflow??
- If it is originating from the disk, which mechanism(s) is ionizing the gas? UV, X-ray, others??

Table 1: Stellar properties

Distance (pc)	130
log Age (log yr)	6.5-7
Sellar Group	Corona Australis
Spectral type	K3
Teff (K)	4759
log stellar luminosity (log Lsun)	-0.23±0.01
log Xray luminosity (log ergs/s)	30.50±0.11
log Lx/Lbol (dex)	-2.85±0.11
Li Eq. Width (mAng)	420.6±13.1
V sini (km/s)	23.05±3.59
Radial velocity (km/s)	-1.46±2.21
Visual Extinction (mag)	0.92±0.20

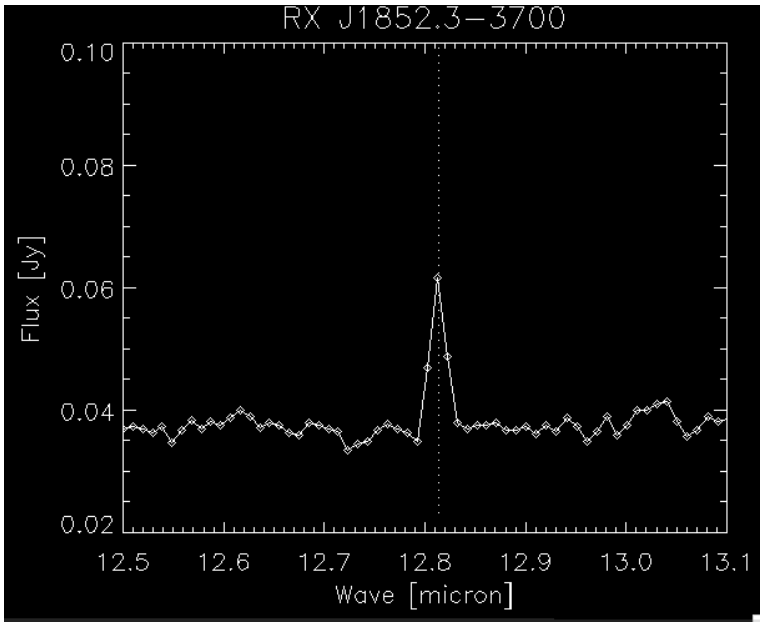

Figure 1: Portion of the high-resolution IRS spectrum, centered on the [NeII] emission line.

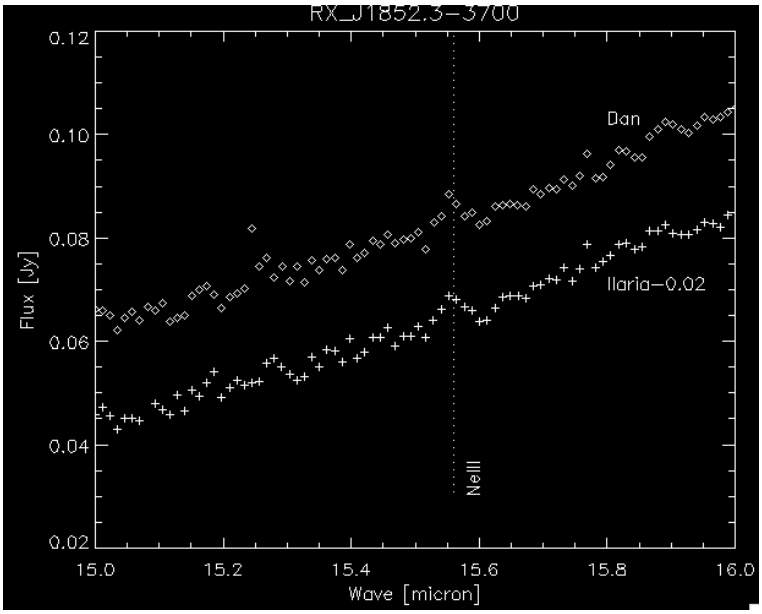

Figure 2: Portion of the high-resolution IRS spectrum, centered on the [NeIII] emission line.

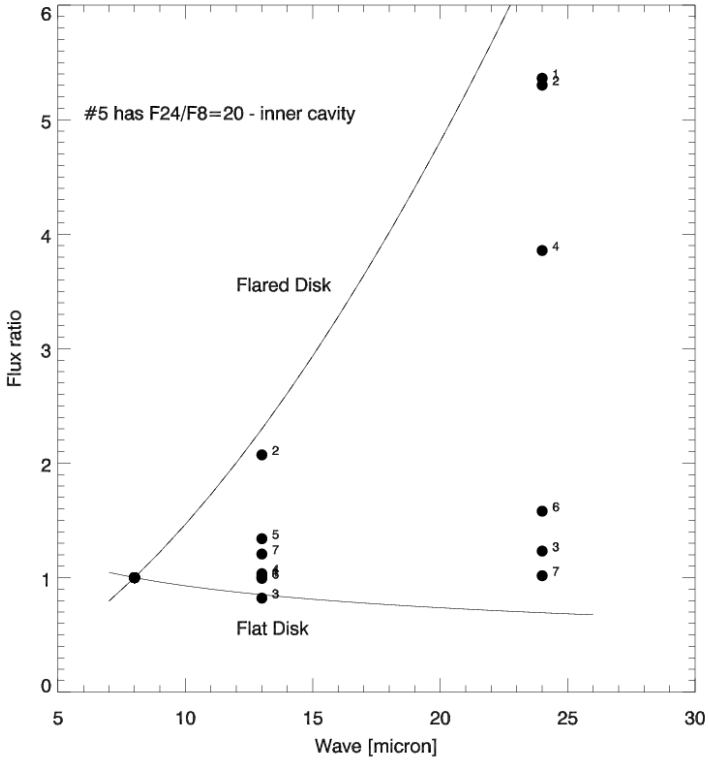

Figure 3: Flux ratios for the 7 FEPS optically thick disks compared to flat and flared(face-on) disk models. Number 5 is RX J1852.3-3700. The F13/F8 of this source is in between the flared and flat disk models but the F24/F8 is much larger, suggesting a large inner dust hole.

Table 2: Line fluxes or 5-sigma upper limits ("ul")from the IRS high-resolution spectrum (10-40 micron). Upper limits are estimated from the spectrum RMS in the wavelength range of 1 micron centered on the expected feature.

Line	λ [micron]	Flux [W/cm^2]	Note	$F_{\rm cont.}$ [Jy]
NeII	12.81	8.68×10^{-22}	detection	0.037
NeIII	15.56	4.90×10^{-22}	5σ ul	0.082
H_2S(2)	12.28	4.81×10^{-22}	5σ ul	0.039
H_2S(1)	17.04	3.52×10^{-22}	5σ ul	0.16
SI	25.23	1.52×10^{-21}	5σ ul	0.61
SIII	18.71	5.68×10^{-22}	5σ ul	0.28
SIII	33.48	2.21×10^{-21}	5σ ul	0.94
SiII	34.80	3.11×10^{-21}	5σ ul	0.98

Table 3: Optical echelle spectrum (3850-9400 Å). Detections and non-detections of lines tracing the accretion, wind, UV flux. Rest wavelengths are from the NIST database (air).

Line	λ(peak) [Å]	Rest wave(Diff) [Å]	FWHM [Å]	Flux [W/cm^2]	Detection?
Hα			–	–	Y
Hβ			–	–	Y
Hγ			–	–	Y
SII	–	6718, 6732	–	–	N
OI	6301.016	6300.304(0.7)	0.8	1.8×10^{-21}	Y
OI	6363.666	6363.776(-0.1)	0.5	8.2×10^{-22}	Y(but other wiggles)???

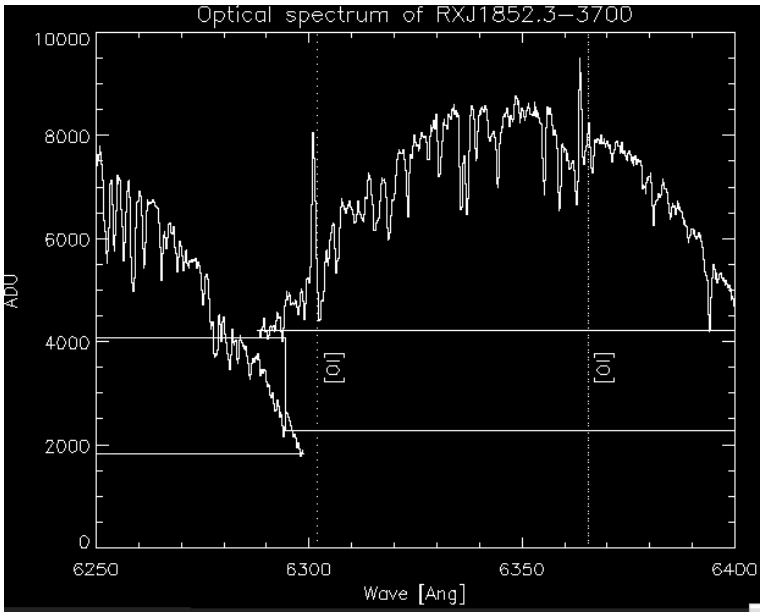

Figure 4: Portion of the high-resolution optical spectrum, centered on the [OI] emission line.

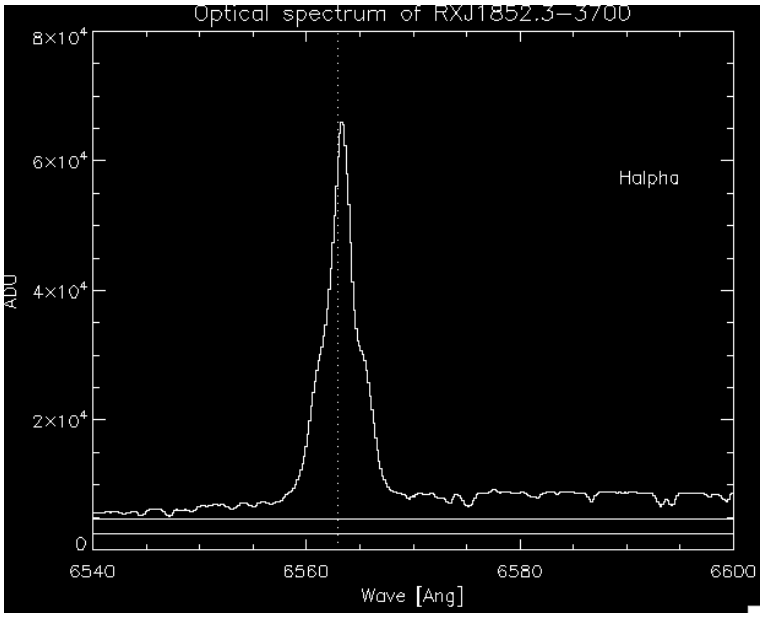

Figure 5: Portion of the high-resolution optical spectrum, centered on the Hα emission line.

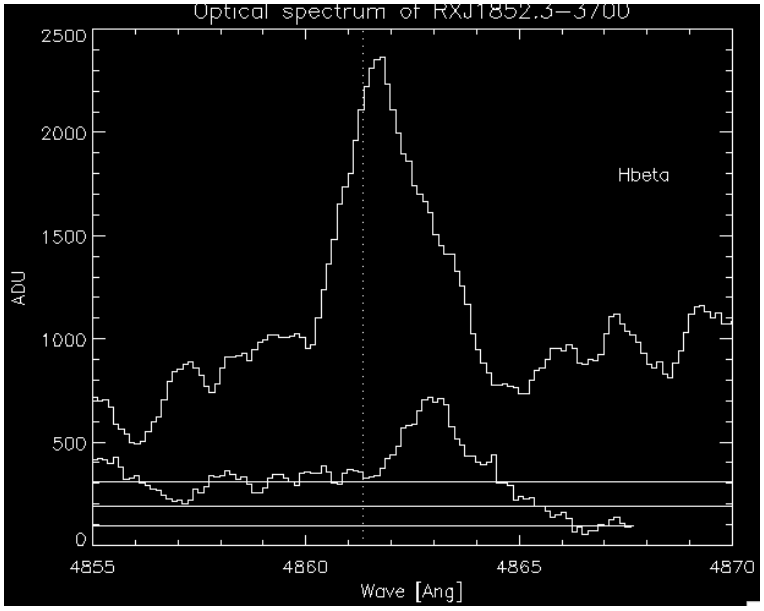

Figure 6: Portion of the high-resolution optical spectrum, centered on the Hβ emission line.

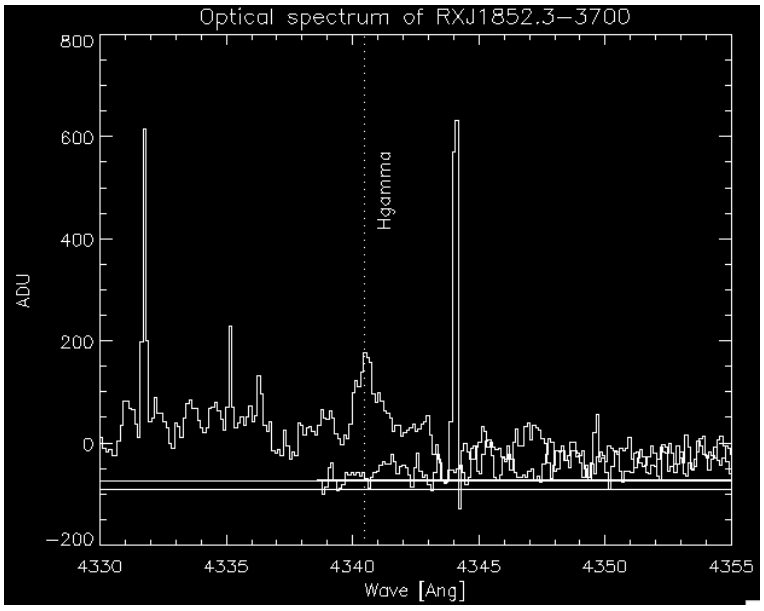

Figure 7: Portion of the high-resolution optical spectrum, centered on the Hγ emission line.