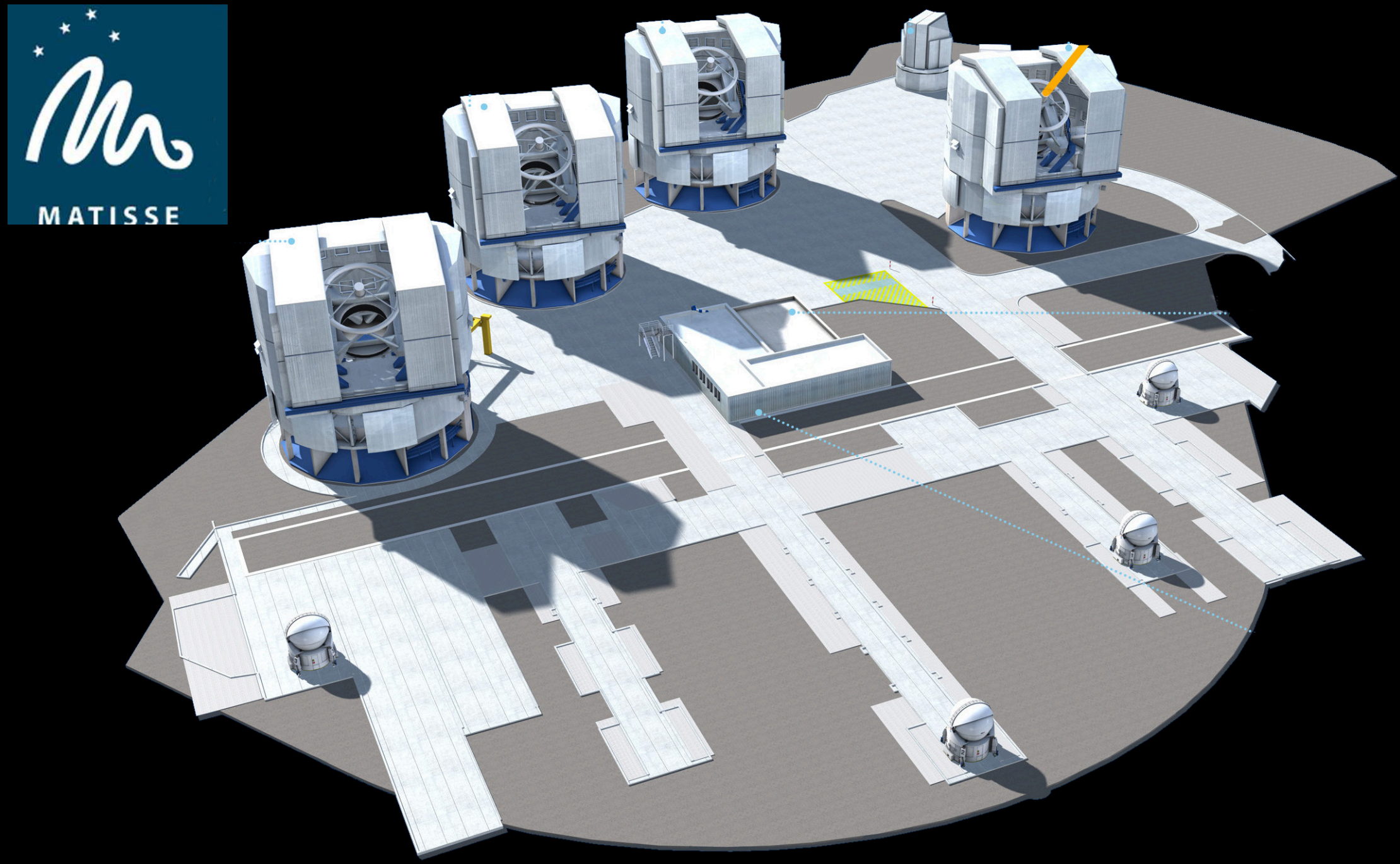
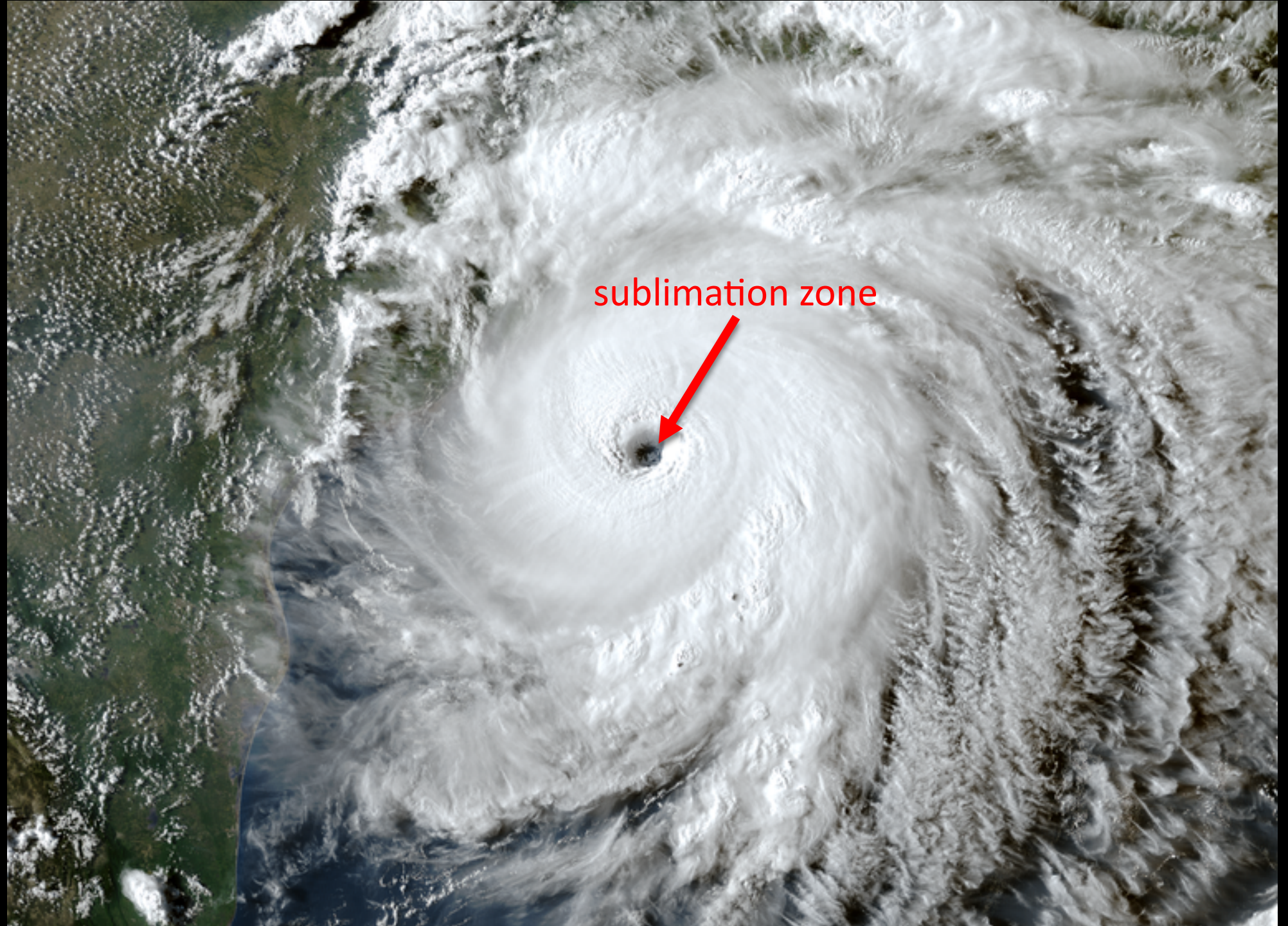
Infrared interferometry: What to do with 4 telescopes?

Credit:Clem & Adri Bacri-Normier (wingsforscience.com)/ESO

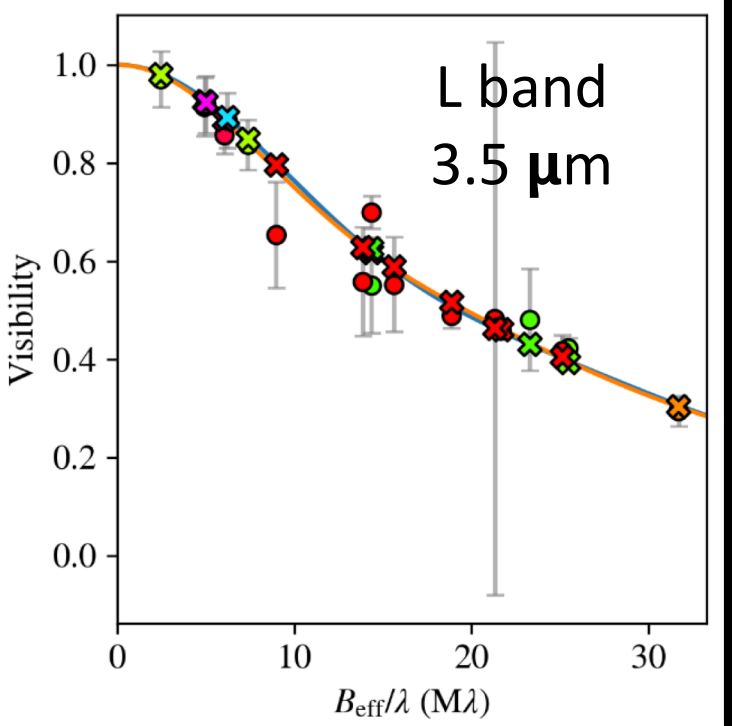
József Varga
Leiden Observatory

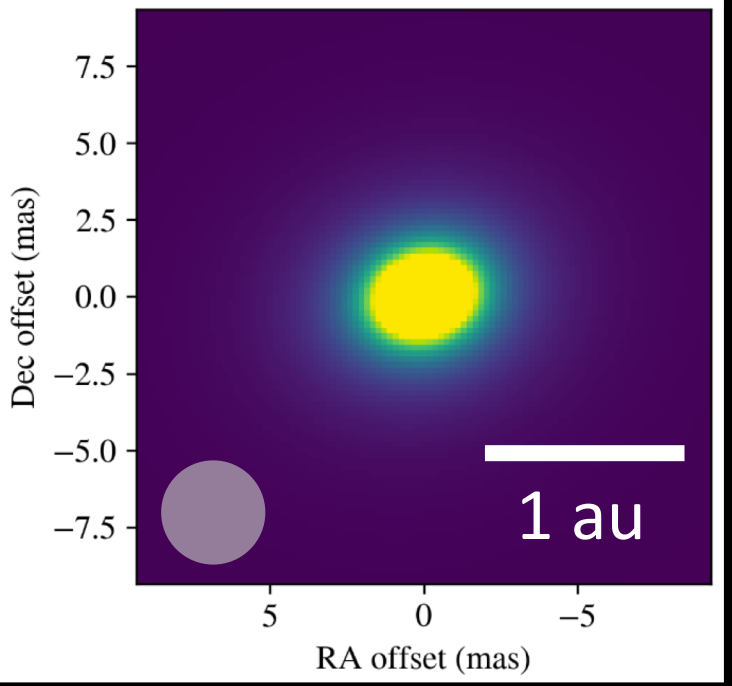

MATISSE



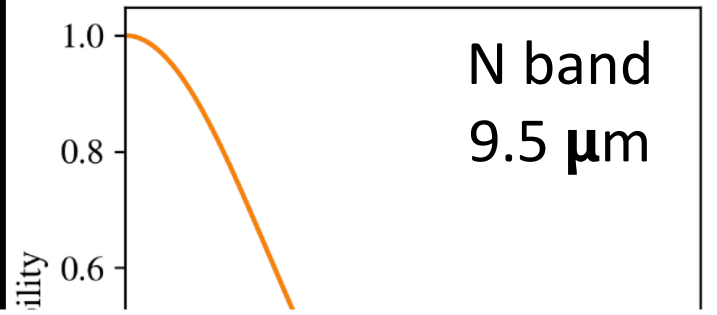
Laura hurricane,
credit: NOAA

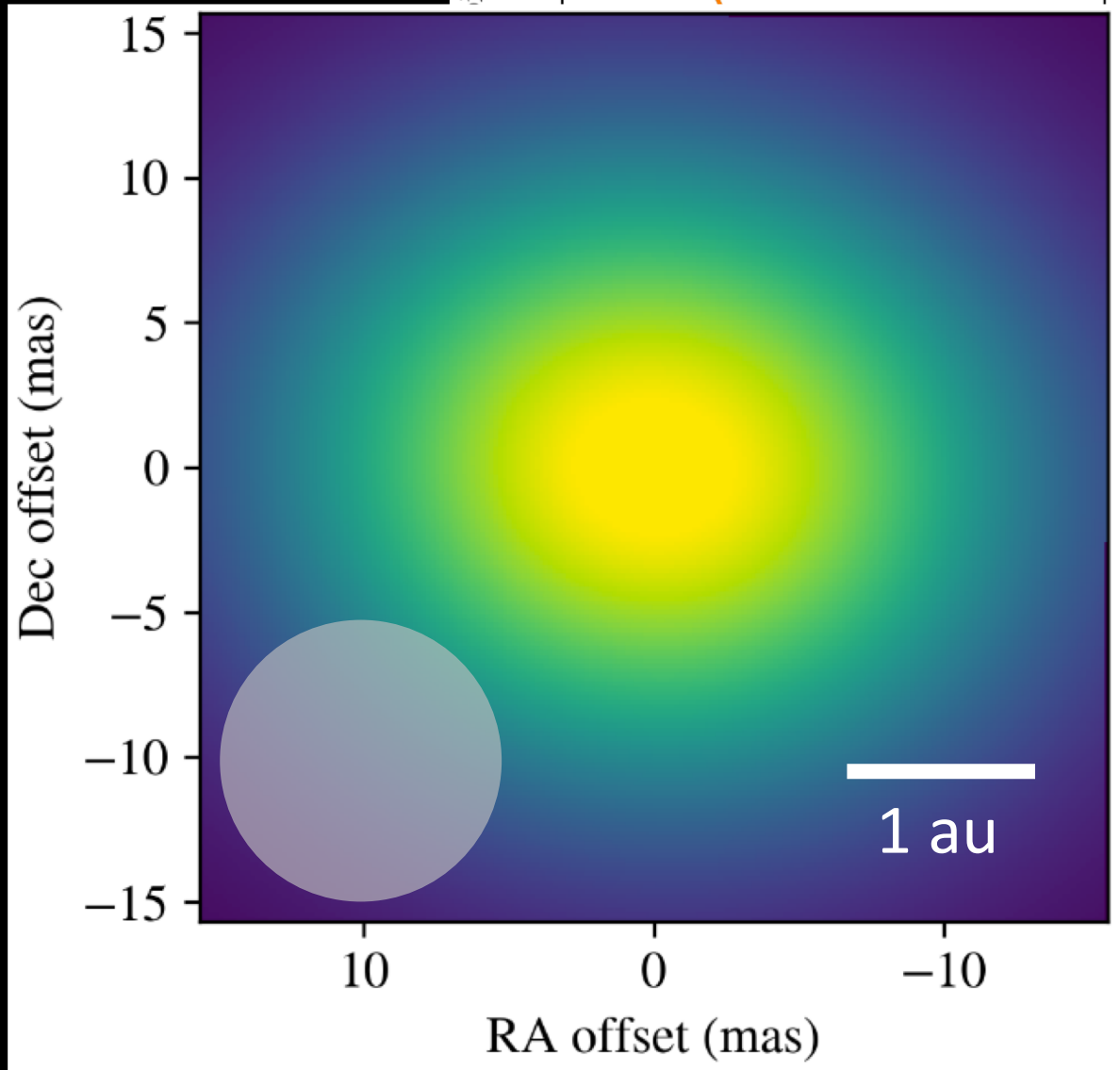
Parametric modelling
MATISSE data
HD 144432



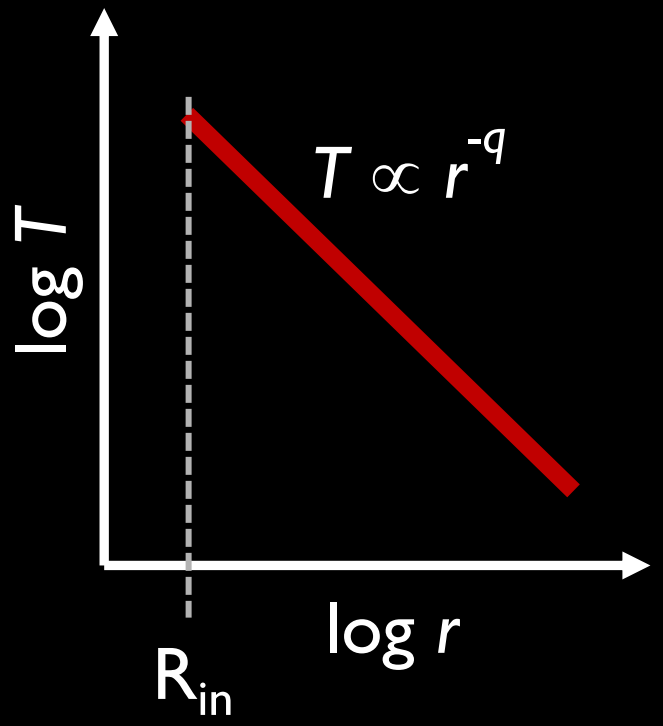


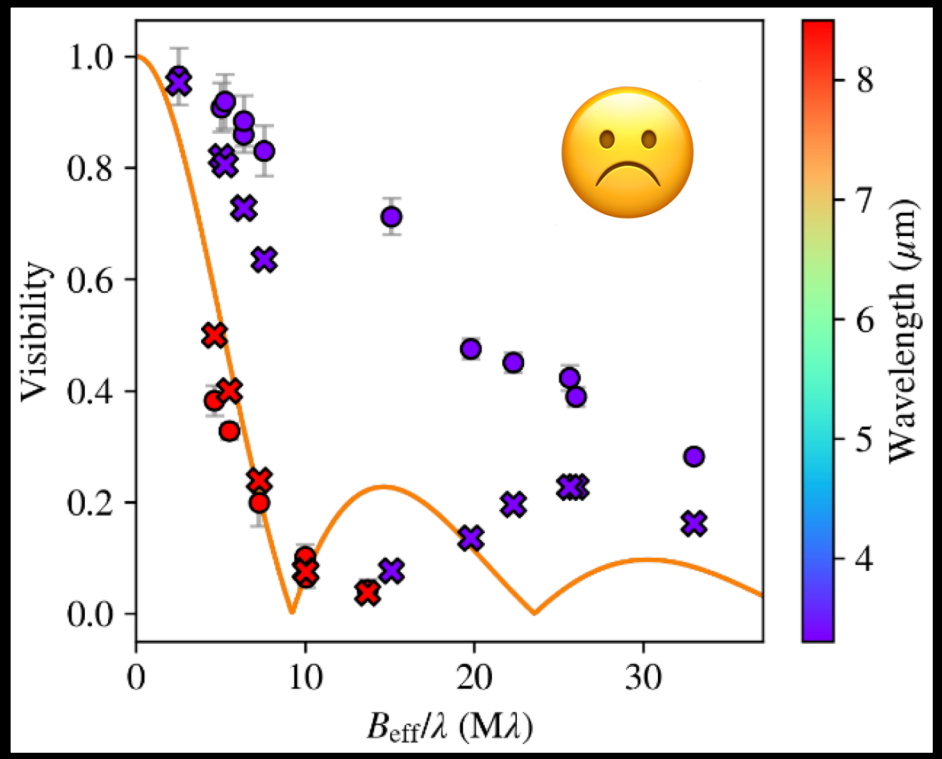
the disk looks bigger at longer wavelengths

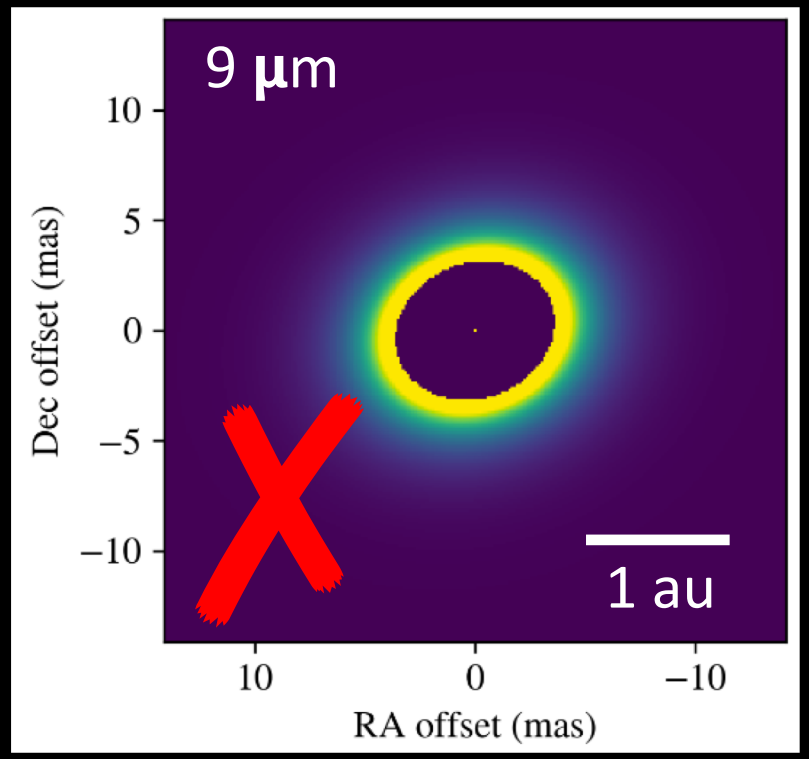




Temperature gradient model







o data

× model

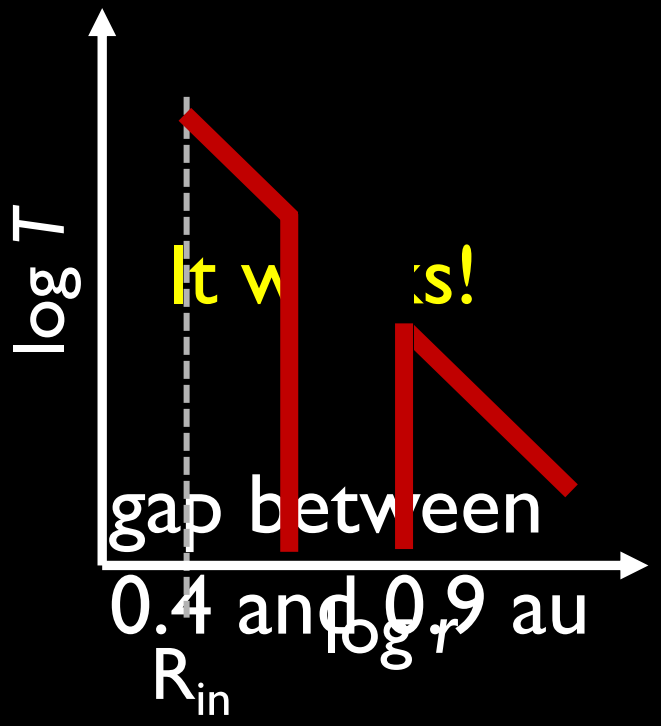
purple: 3 μm

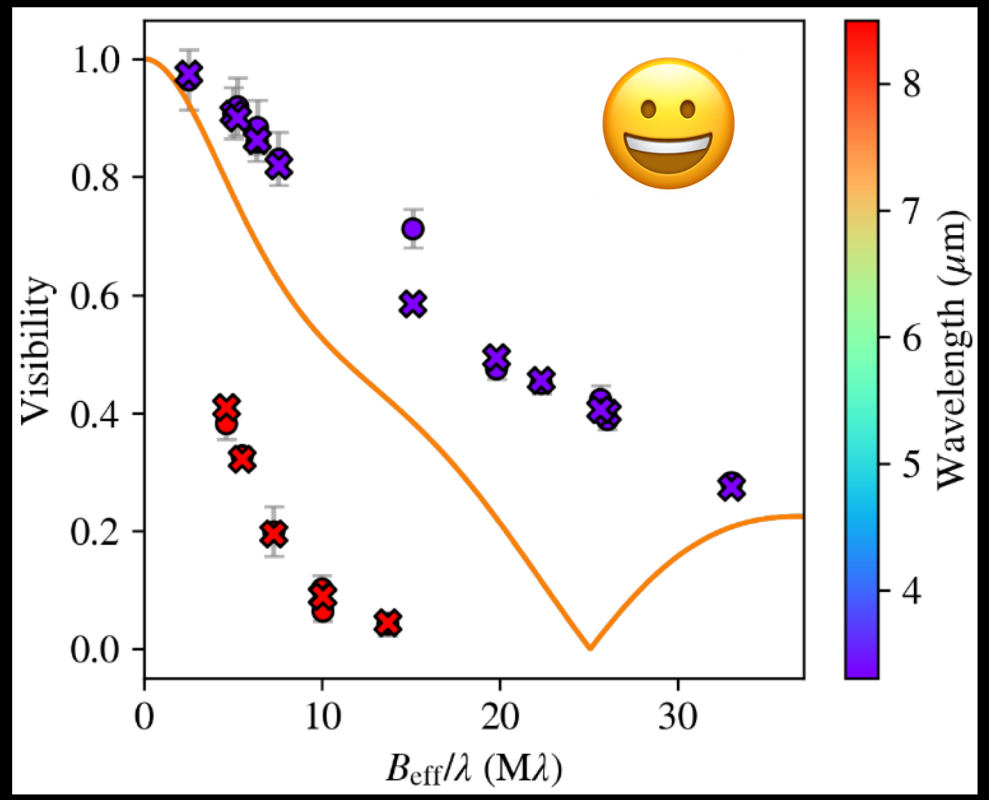
red: 9 μm

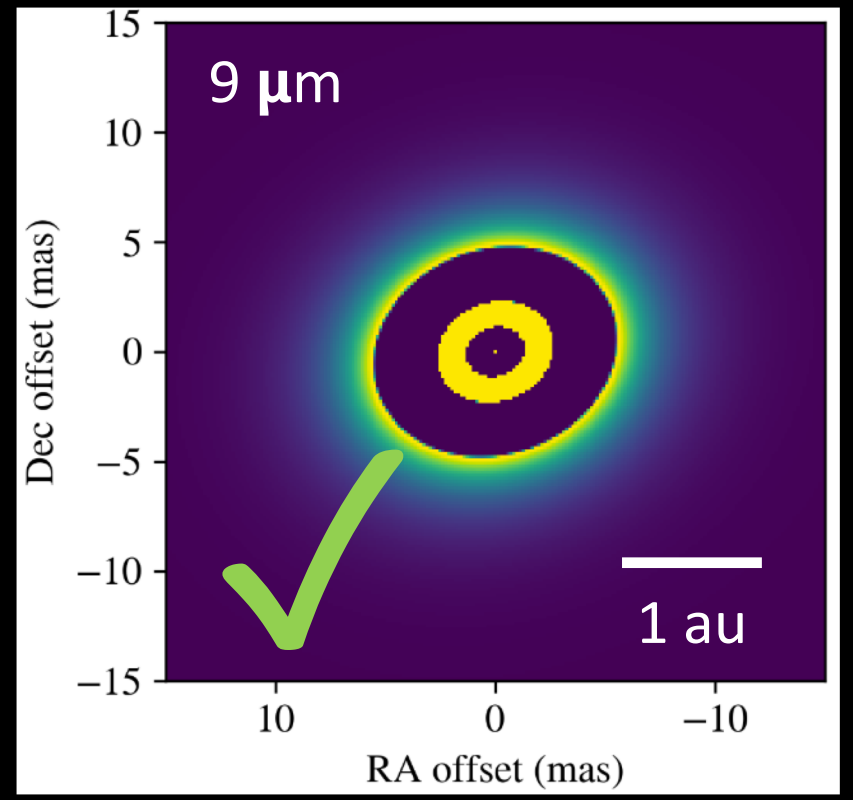
(ignore the orange curve)

Temperature gradient model

Let's carve a gap!







o data

× model

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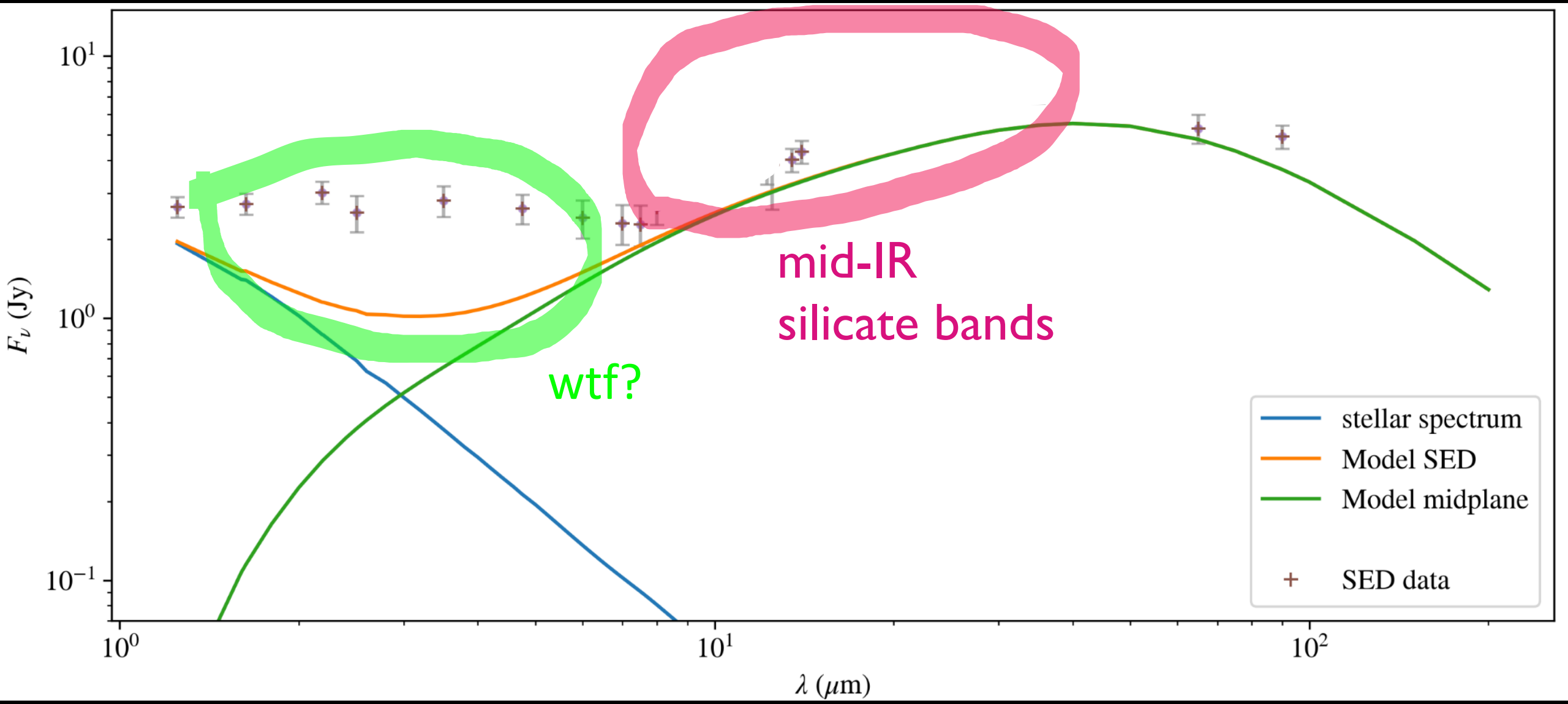
(ignore the orange curve)

What about the SED?

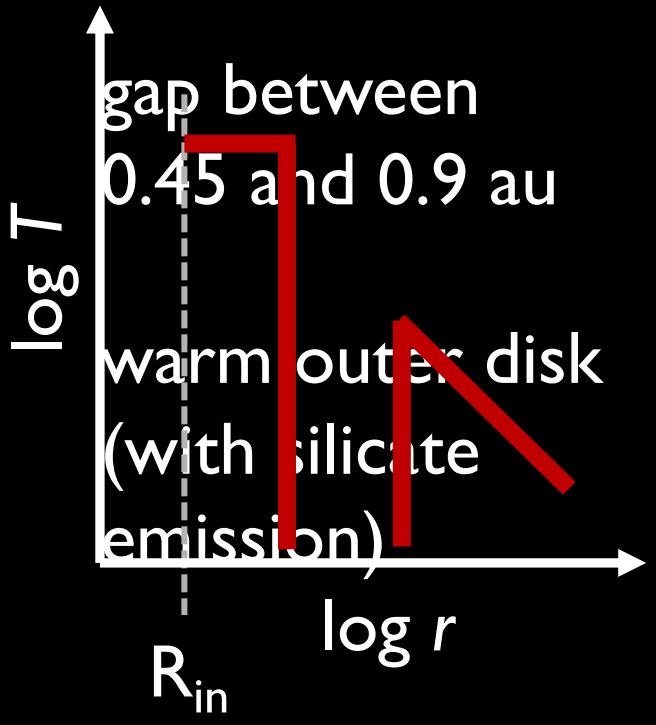


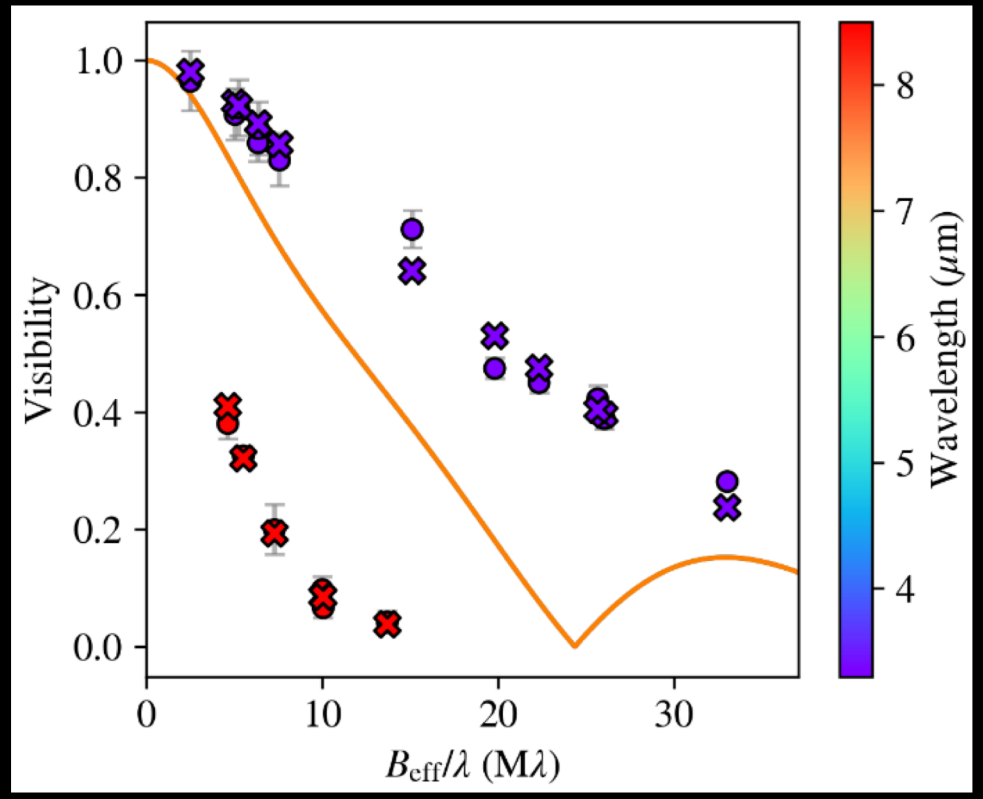
The solution

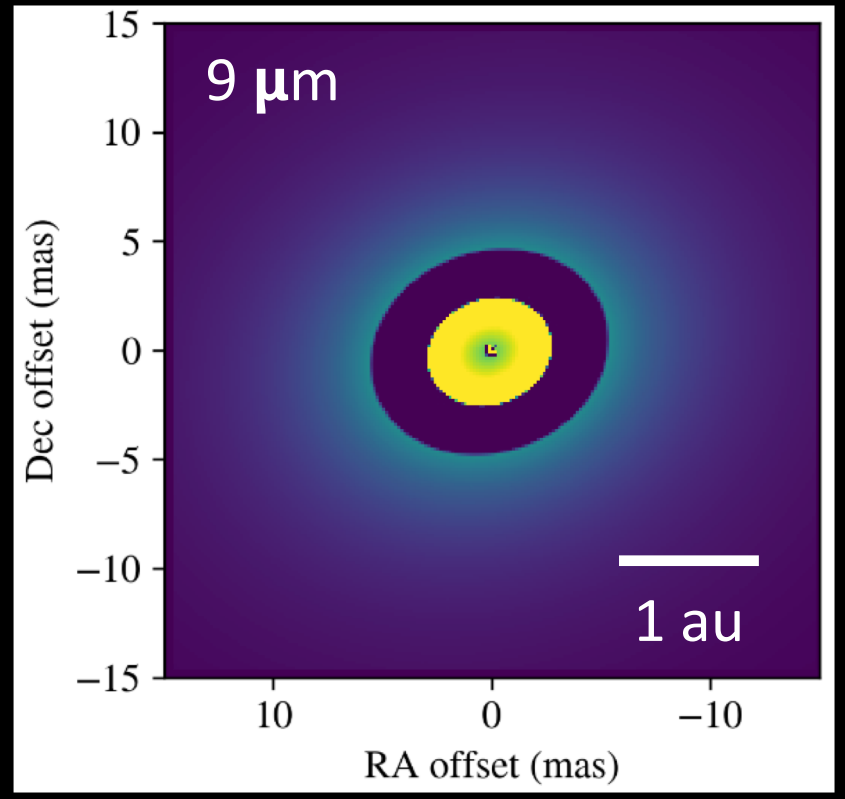
uniformly hot inner region (~1500 – 2000 K)

gap between 0.45 and 0.9 au

warm outer disk (with silicate emission)







o data

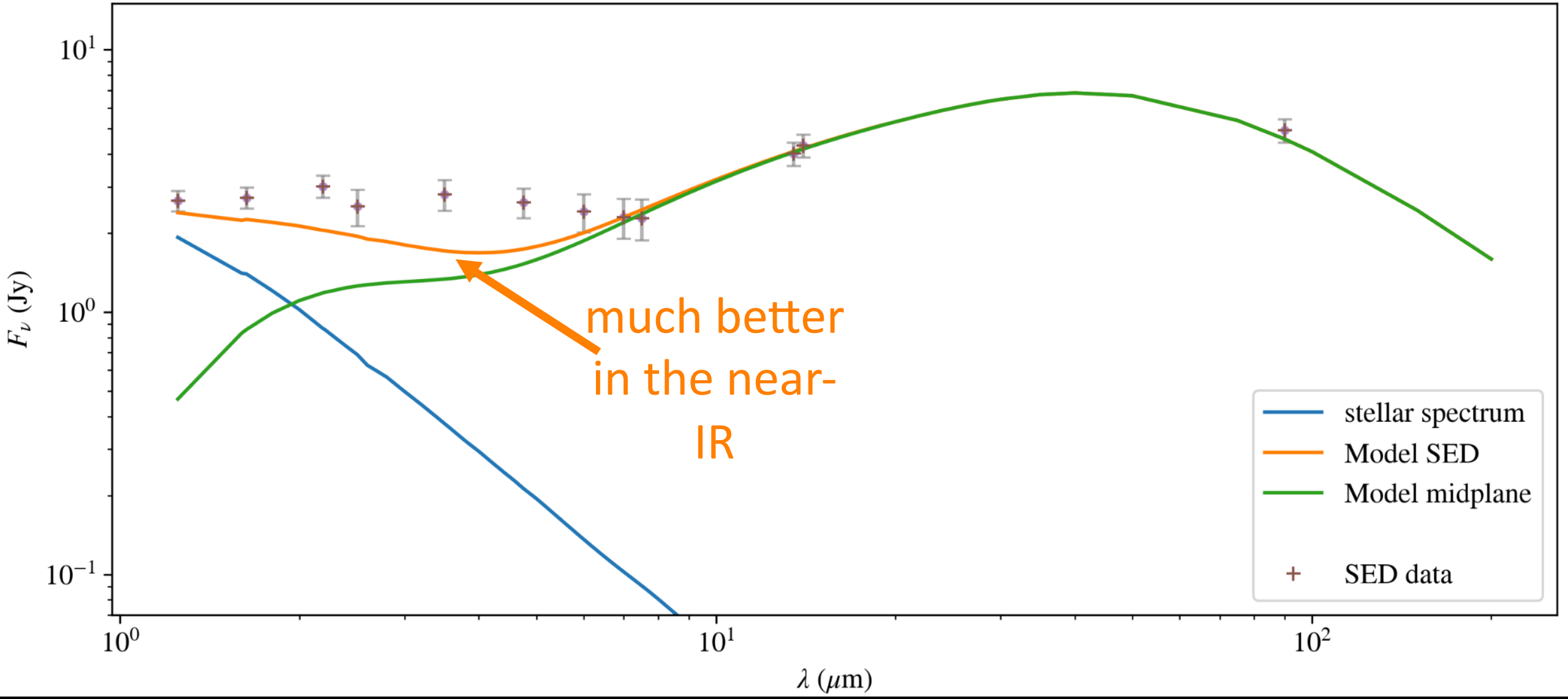
× model

purple: 3 μm

red: 9 μm

(ignore the orange curve)

The SED


much better in the near-IR
stellar spectrum
Model SED
Model midplane
SED data
F_ν (Jy)
λ (μm)
10^1
10^0
10^{-1}
10^0
10^1
10^2

Take home

- multi-band interferometry + SED modelling can reveal substructures near 1 au
- HD 144432
  - hot inner region + gap + warm outer disk
  - more to come: silicates, asymmetry & time variability