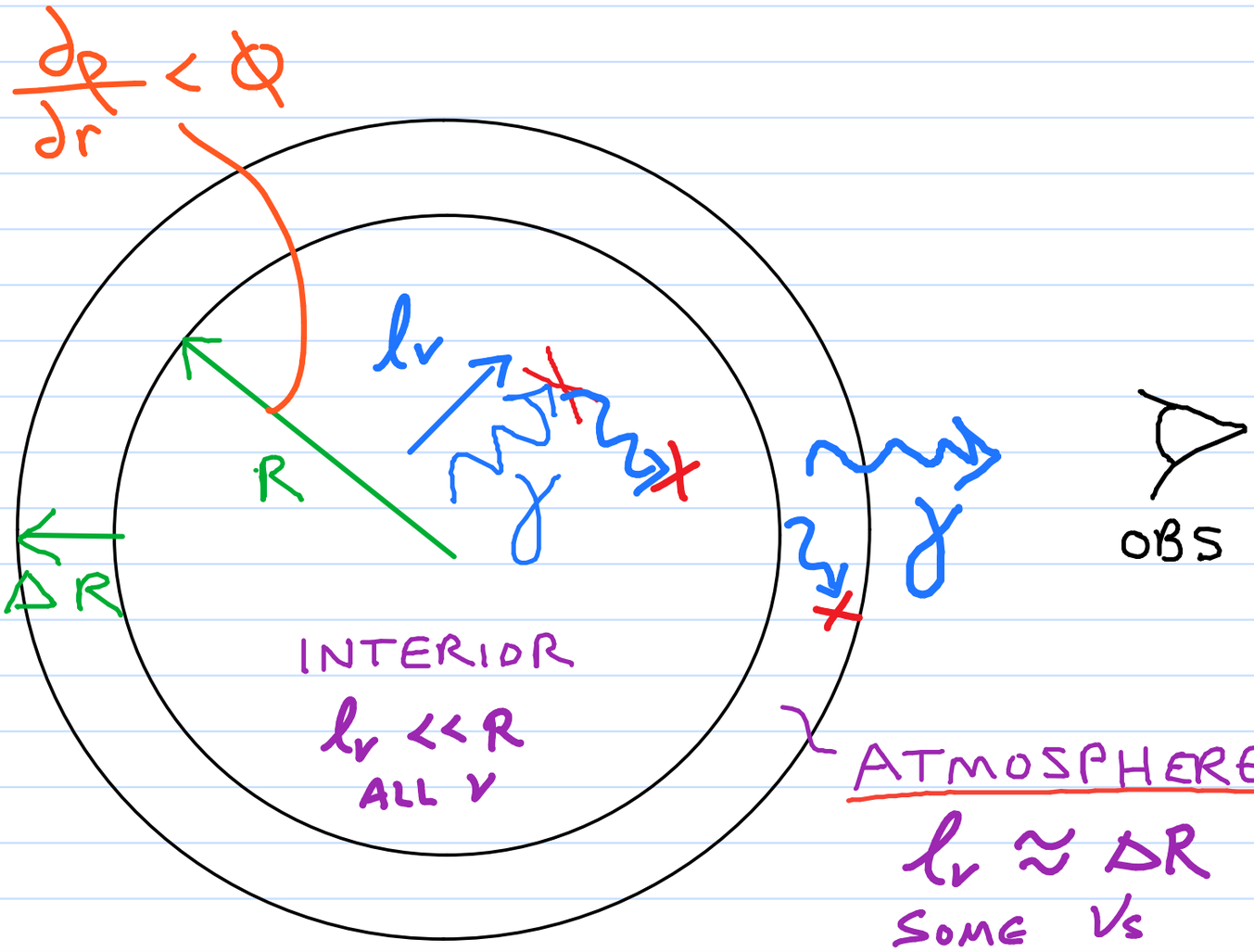
STELLAR ATMOSPHERES



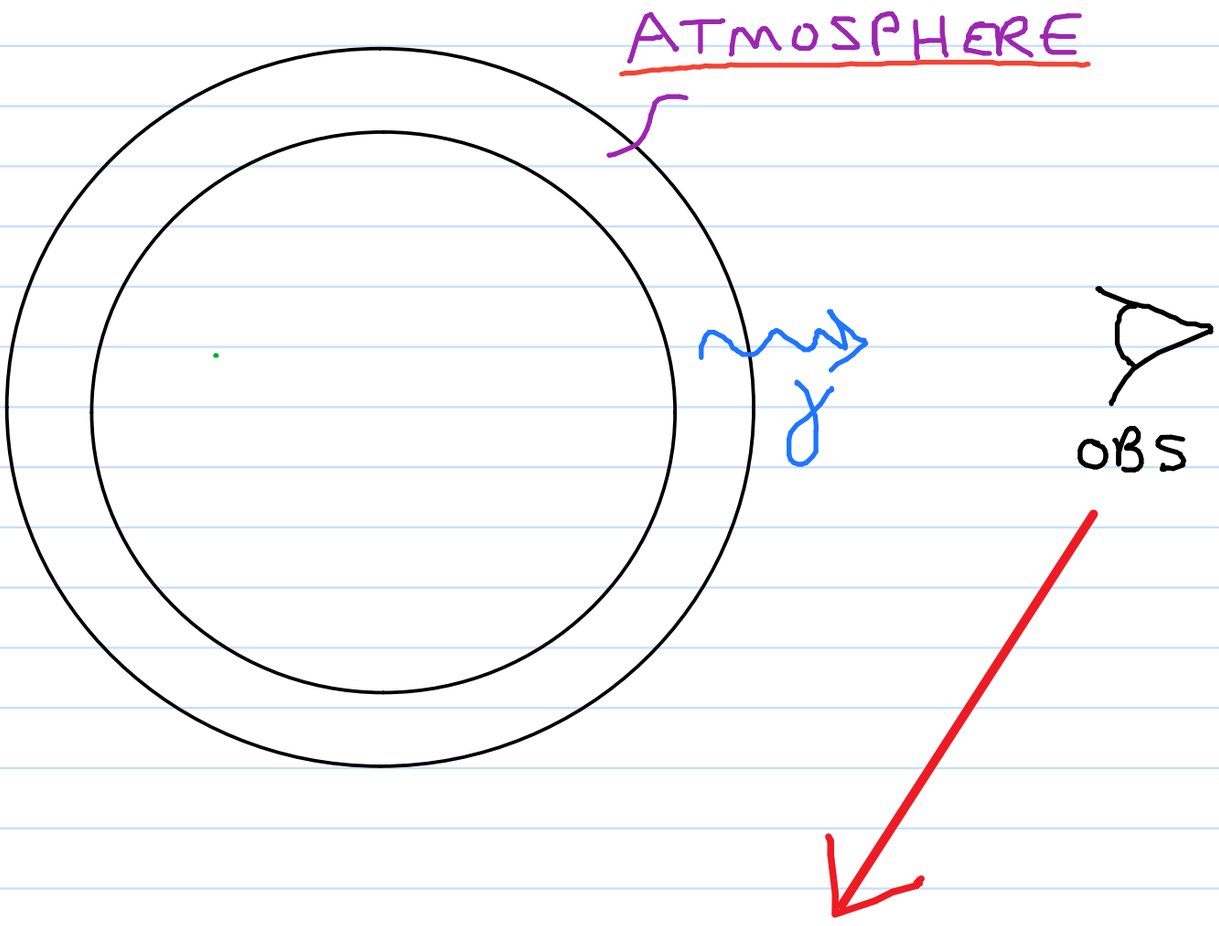
$\frac{\Delta R}{R} \ll 1$ (NORMALLY)

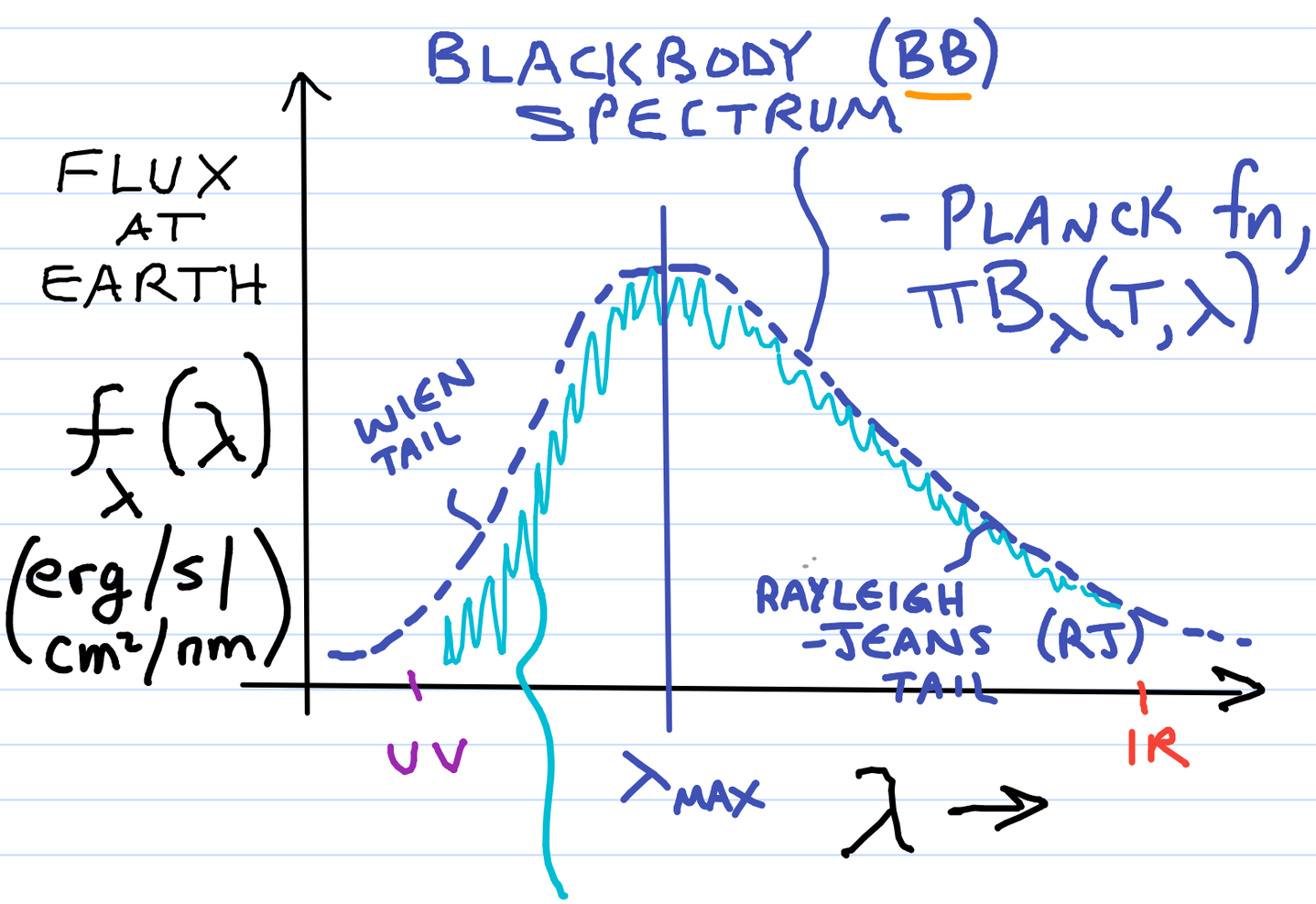
$l_\nu \equiv$ PHOTON MEAN FREE PATH AT FREQ. ν

KIRCHOFF CASE III:

- THINNER COOLER GAS BACK-LIT BY HOT DENSE BLACKBODY

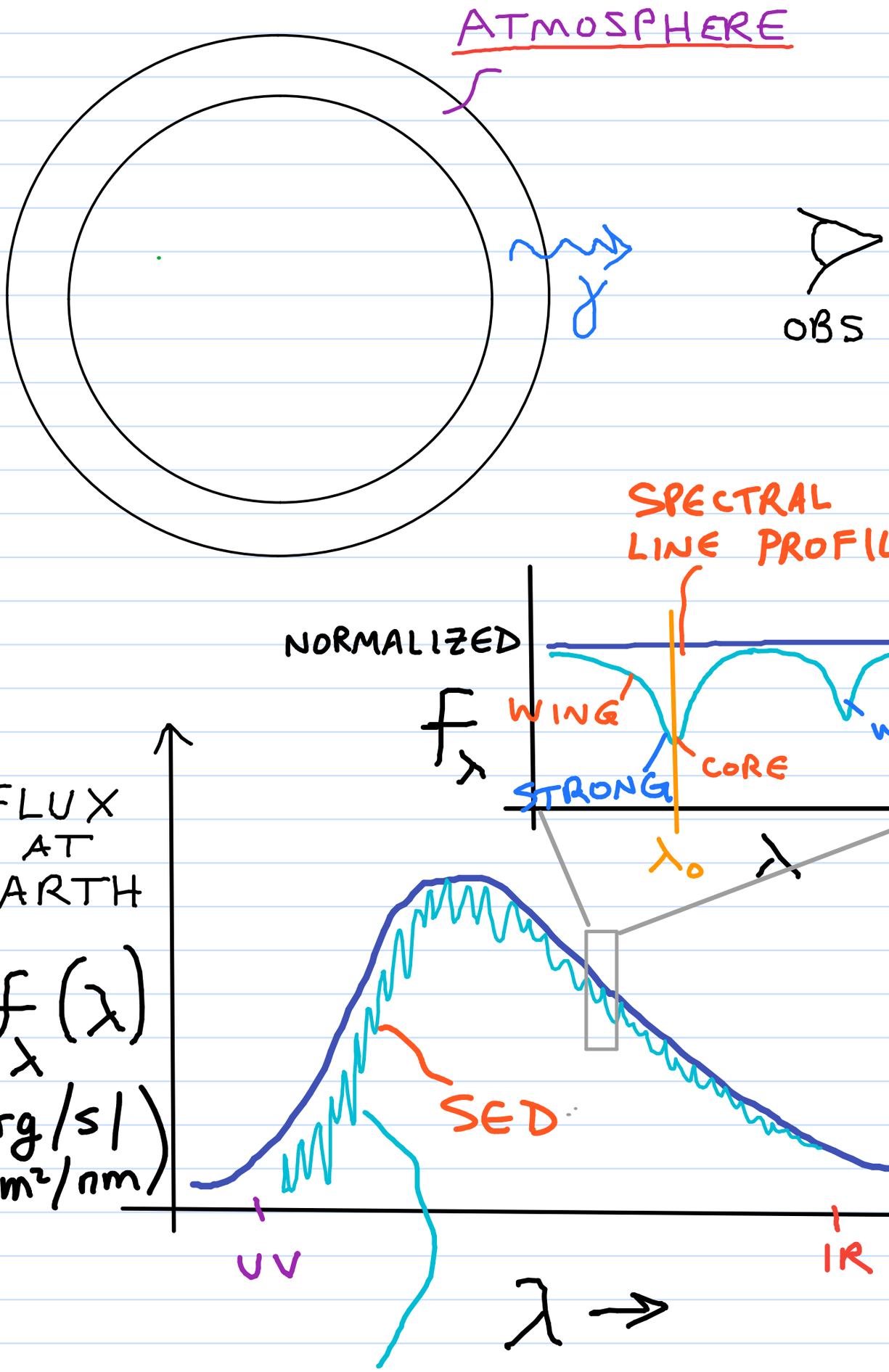
STELLAR ATMOSPHERES





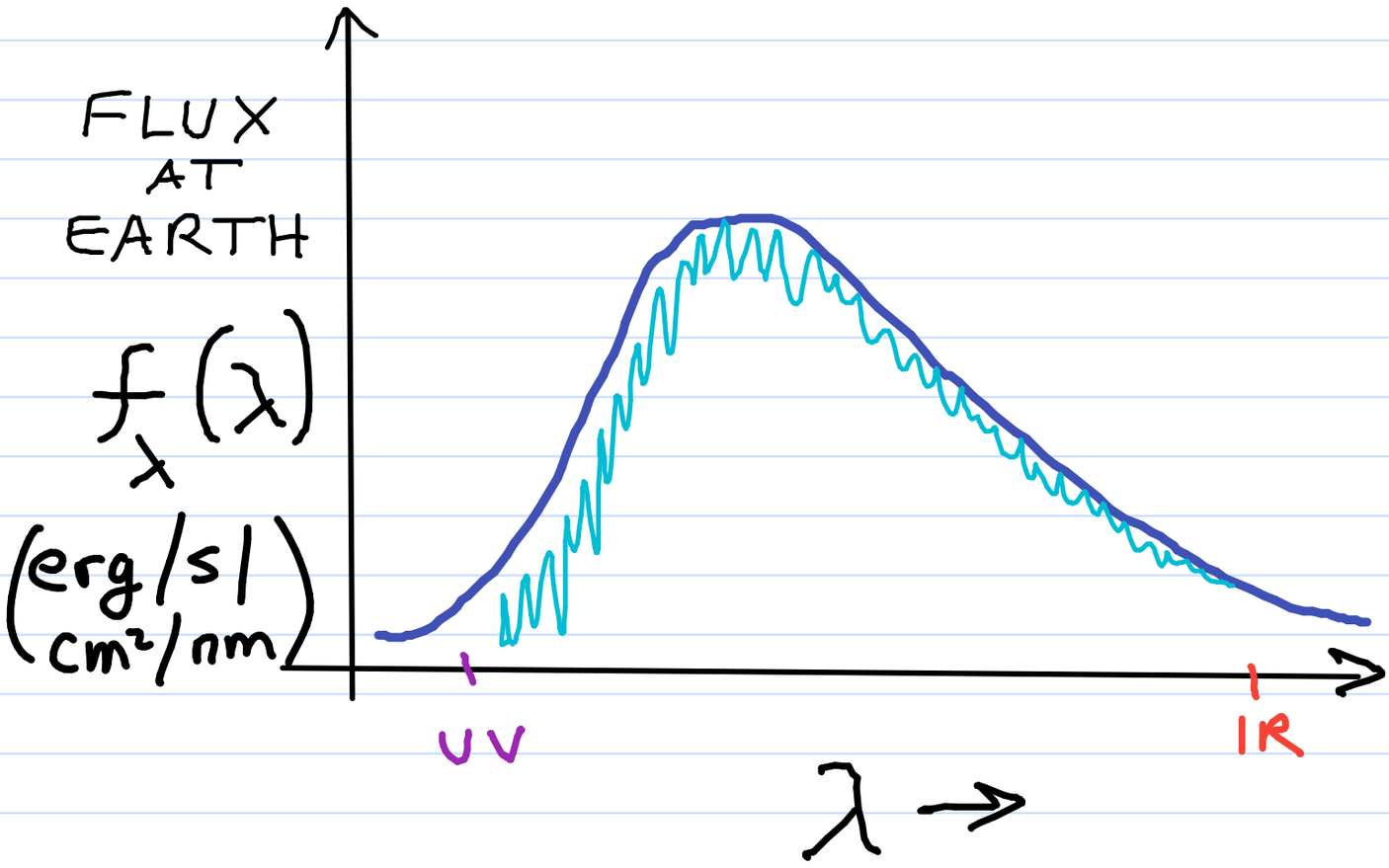
→ LINE-BLANKETED SPECTRAL ENERGY DISTRIBUTION (SED)

STELLAR ATMOSPHERES



→ SPECTRAL ENERGY DISTRIBUTION (SED)

STELLAR SPECTRUM



$\sim 10^6$ SPECTRAL LINES

$\Rightarrow$ COMPLEX SIGNAL ✗

$\Rightarrow$ INFORMATION-RICH ✓

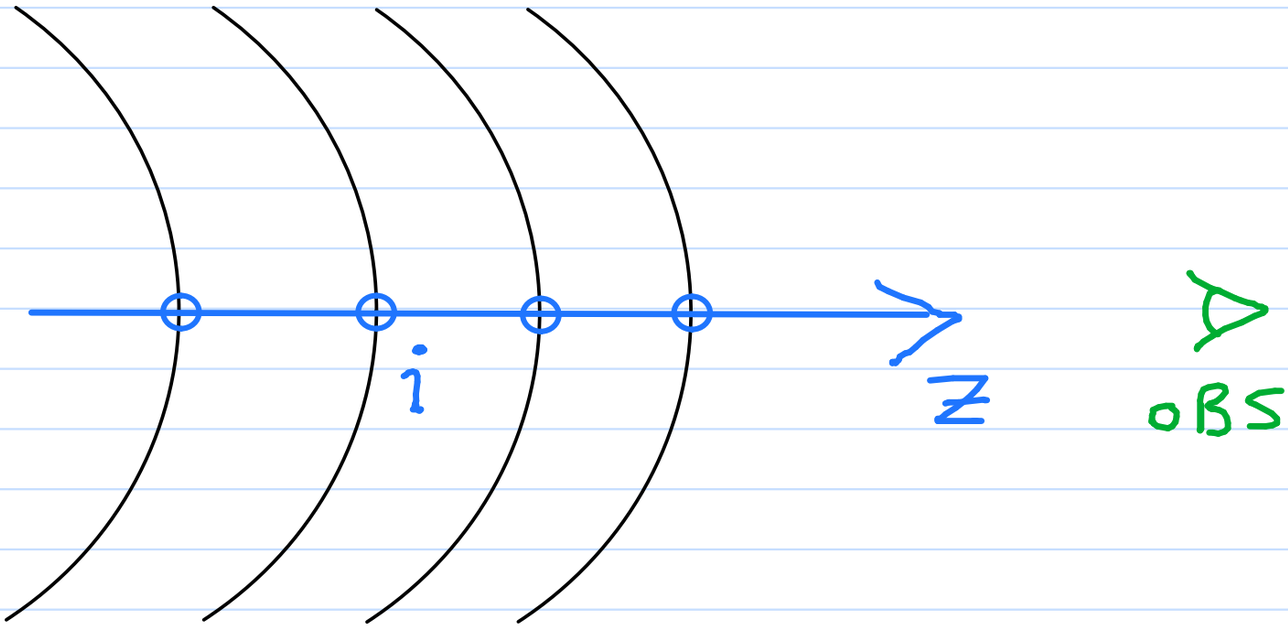
INFORMATION:

1) STELLAR PARAMETERS (TYPE OF STAR)

2) CHEMICAL COMPOSITION

3) GAS MOTIONS

ATMOSPHERIC STRUCTURE

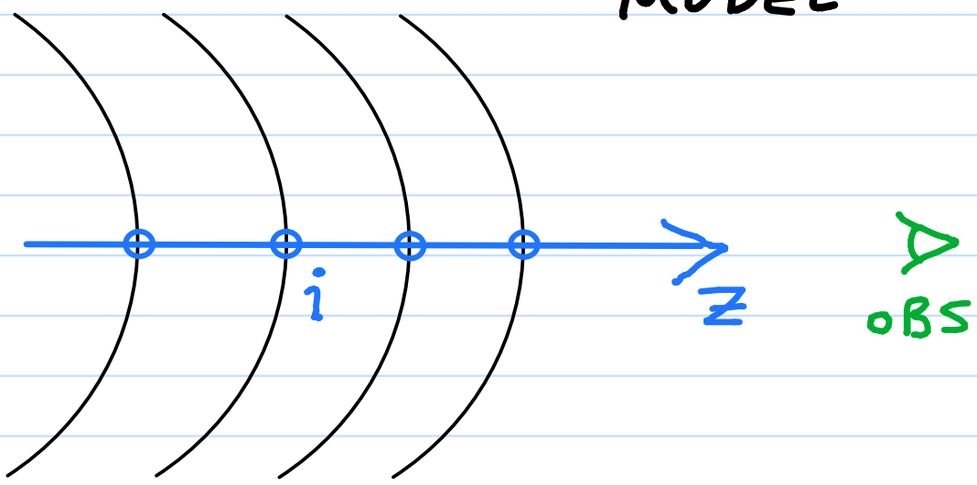


1D STRUCTURE:

$T_{KIN}(z_i)$, $P_{gas}(z_i)$, $\rho(z_i)$,
$N_e(z_i)$, ...

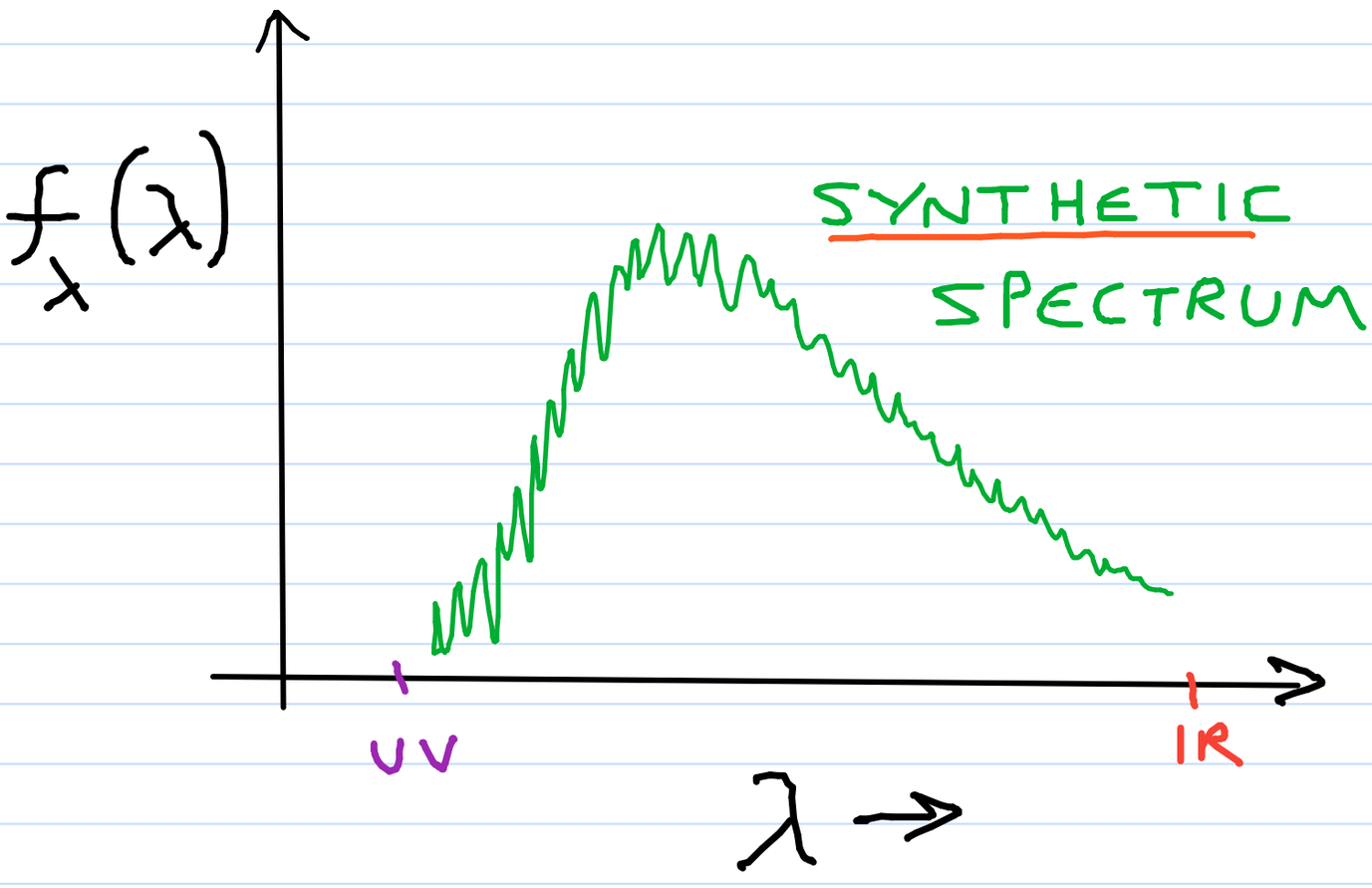
ATMOSPHERIC STRUCTURE

MODEL



$T_{KIN}(z_i)$, $P_{gas}(z_i)$, $\rho(z_i)$,
$N_e(z_i)$, ...

FORWARD MODELLING



GENERAL ASTROPHYSICAL KNOWLEDGE:

1) GAS + RADIATION EQUILIBRIUM

2) RADIATIVE TRANSFER
   - OPACITY
   - SPECTRAL LINE FORMATION

3) ATOMIC PHYSICS

ALSO APPLIES TO:
- DISKS (AGN)
- ISM, IGM
- PLANETARY ATMOSPHERES
- STELLAR INTERIORS
- INPUT SEDs FOR POPULATION SYNTHESIS
  - INTEGRATED LIGHT SEDs OF GALAXIES & CLUSTERS

ESSENTIAL REVIEW:

1) MK SPECTRAL CLASSES

2) HR DIAGRAM

3) BLACKBODY SPECTRUM

4) PHOTOMETRIC COLORS
MAGNITUDES