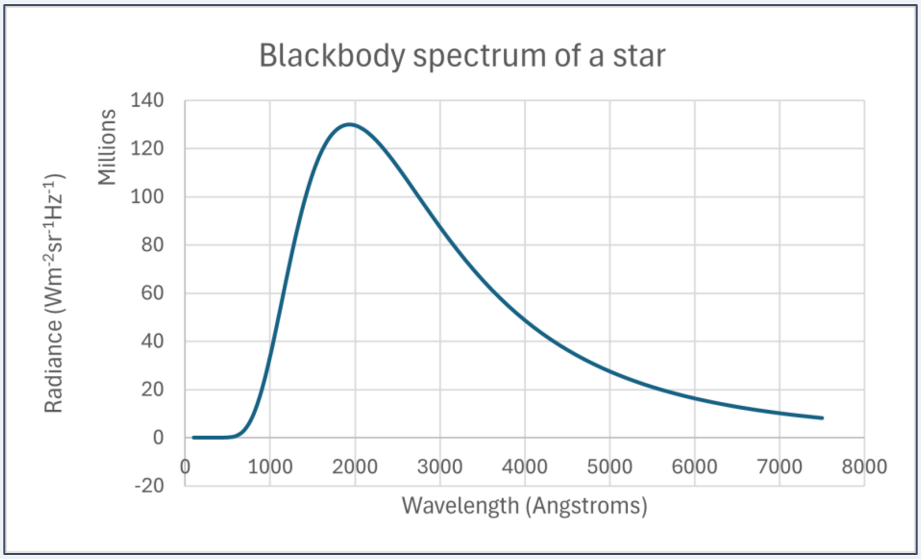
CLASSIFY A STAR

Stars are classified based mainly on their temperature, and the different elements we see present in their spectra.

We can measure the temperature of a star using a simple equation called Wien's Law. This is because stars emit light as a blackbody. The peak of this curve gives us the temperature of the star.

Wien's Law
$T_{eff} = \dfrac{W}{\lambda_{max}}$
Where W is Wien's constant = 2.898 x 10−3 mK

In ideal circumstances a star's spectrum would look like this:



1. Look at this spectrum and note down the estimated wavelength peak in the curve, λ_{max}.	1932 Å
2. Convert this answer from Angstroms (Å) to metres (where $1\ \text{Å} = 10^{-10}\text{m}$).	1.932×10^{-7} m
3. Use Wien's Law to work out the effective temperature of the stars, T_{eff}	15,000 K

The effective temperature we calculate for a star then gives us the classification based on the table below.

Spectral Type	O	B	A	F	G	K	M
Temperature (Kelvin, K)	28,000 - 50,000	10,000 - 28,000	7,500 - 10,000	6,000 - 7,500	5,000 - 6,000	3,500 - 5,000	2,500 - 3,500

4. Use the temperature from part 3 to work out the spectral classification of the star.

B

In reality, we never see a perfect blackbody spectrum of a star.

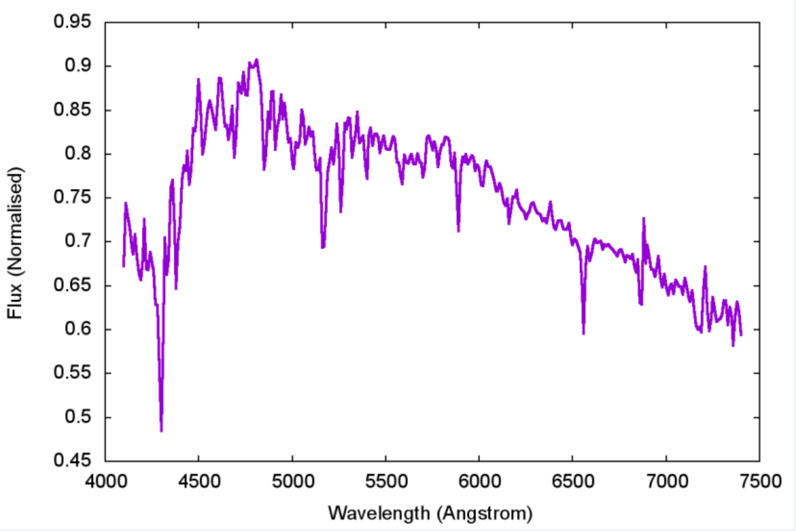
The spectrum is covered with dips where the stars light has been blocked by some material like gas and dust in the atmosphere of the star.

These are called **absorption lines**.

This can make finding the peak of the blackbody much harder.

Try to carry out the same classification on this real spectrum:

Star 1: HIC113055



Peak wavelength

4900 Å

Peak wavelength

4.9×10^{-7} m

Peak temperature

5914 K

Spectral Classification

G

CLASSIFY A STAR

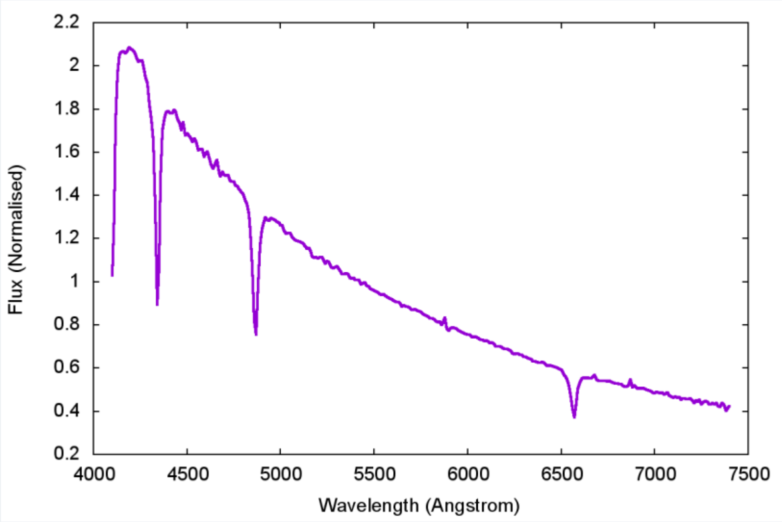
Absorption lines happen at set wavelengths for each different element. So, if we know where an absorption line is, we know what element produced it.

In this way we can probe the chemistry of the stars around us by noting the absorption lines in the spectrum.

It's very difficult to do on noisy spectra – like **Star 1** but can be done by computer programmes. If the spectrum in clearer, we can do it by hand.

5. Use the table of some reference spectral lines to try and locate the main features in **Star 2**'s spectrum.

Element	Wavelength (3500-7500Å)
Hydrogen	4103, 4341, 4862, 6564
Iron	4307, 5270
Helium	3889, 4471, 5015, 5875, 6680, 7065
Magnesium	5176, 5184
Sodium	5889, 5895
Nitrogen	6529, 6550, 6585



Star 2: HIC49854

This is a Class A star
Spectral Lines:

Absorption in hydrogen @

4103 Å, 4341 Å, 4862 Å and 6564 Å