



UNSW
SYDNEY

Spotted Python

Week 9 Tutorial

★ Photometric
redshift

Photometric Redshift

- ★ Faster but less accurate than spectroscopic redshift
- ★ Template fitting to a range of galaxy spectral energy distributions (SEDs)
- ★ Function of star formation history and the geometric arrangement of stars and gas content in galaxies
- ★ Energy versus wavelength
- ★ Fitting flux inputs of an object to a range of known spectra
- ★ Best fit is determined by a χ^2 minimisation process

$$\chi^2 = \min \left(\sum_i^N \frac{(O_i - E_i)^2}{E_i} \right)$$



Running EAZY

- ★ Easy and Accurate z_{phot} from Yale
- ★ Installing eazy-py
 - ★ **pip install eazy**
 - ★ **pip install git+https://github.com/karllark/dust_attenuation.git**
- ★ Installing dust attenuation
 - ★ **pip install git+https://github.com/karllark/dust_attenuation.git**



Initial Mass Function

- ★ Initial mass function (IMF) is defined as the number of stars that have formed per unit area of the galactic disk (pc^{-2}) per unit logarithmic (base 10) interval
- ★ Miller-Scalo 1979

$$\xi(M) = 0.753M^{-1.4}$$

- ★ Chabrier 2003

$$\xi(\log M) = \frac{3.63}{M \ln 10} \exp \left[-\frac{(\log M - \log 0.079)^2}{2(0.69)^2} \right]$$

- ★ Both are normalised for $0.01 \leq M \leq 1M_{\odot}$



Integration

- ★ `scipy.integrate`
 - ★ <https://docs.scipy.org/doc/scipy/tutorial/integrate.html>
 - ★ Provides several integration techniques
- ★ `np.trapz`
 - ★ <https://numpy.org/doc/1.15/reference/generated/numpy.trapz.html>
 - ★ Integrates along the given axis using the composite trapezoidal rule
- ★ Complete **Exercise 1**



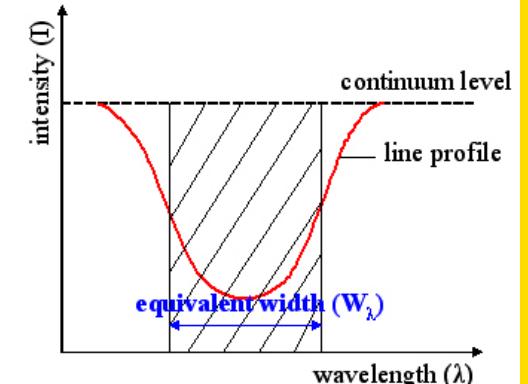
Equivalent Width

- ★ Measure of the area of a spectra line
- ★ Form a rectangle with a height equal to the continuum emission and finding the width such that the area of the rectangle is equal to the area in the spectral line. For absorption lines:

$$W_\lambda = \int \left(1 - \frac{F_\lambda}{F_c}\right) d\lambda$$

where F_λ is the flux of the spectra line and F_c is the flux of the continuum

- ★ Complete **Exercise 2**



Cosmological Calculator

- ★ <https://cosmocalc.icrar.org/>
- ★ `astropy.cosmology`
 - ★ <https://docs.astropy.org/en/stable/cosmology/index.html>
- ★ Test the consequences of changing the cosmological parameters

