

(2/12, 1 hour) Continue working on your exposure time calculator software by adding routines to calculate the S/N of a given exposure. You will want to call your count equation routine to get the signal for an object of some input magnitude, call it again to get the background for a given sky brightness, allow for an input sky area/image size (with suitable default value), and call a routine to return the readout noise for an input pixel scale and input sky area/image size. Validate your routine using the results from the previous question.

(previous question) Start to develop a software module that implements the count equation that will eventually be used for an exposure time calculator. The module should include individual functions that return values for each of the terms in the count equation: photon flux given input magnitude, telescope area, atmospheric transmission, system transmission (split into separate routines for each of telescope throughput, instrument throughput, filter throughput, and detector efficiency). Each routine should accept as input a wavelength or array of wavelengths, and return values at all of the specified input wavelengths; for the initial effort you could just return a constant value at all wavelengths, but look forward to building in the capability for wavelength dependence, e.g., interpolating from a list of wavelength/values from an input file. A higher level function should return the estimated counts integrated over all wavelengths. You should make appropriate use of input keywords and default values. You are strongly encouraged to sketch out the design of the program before starting to write it, considering the eventual use of the program to provide exposure time estimates for all of the APO 3.5m instruments (and perhaps others), where you will have wavelength dependent throughputs for multiple components. Test the program by using it to do the calculation for the NMSU 1m.