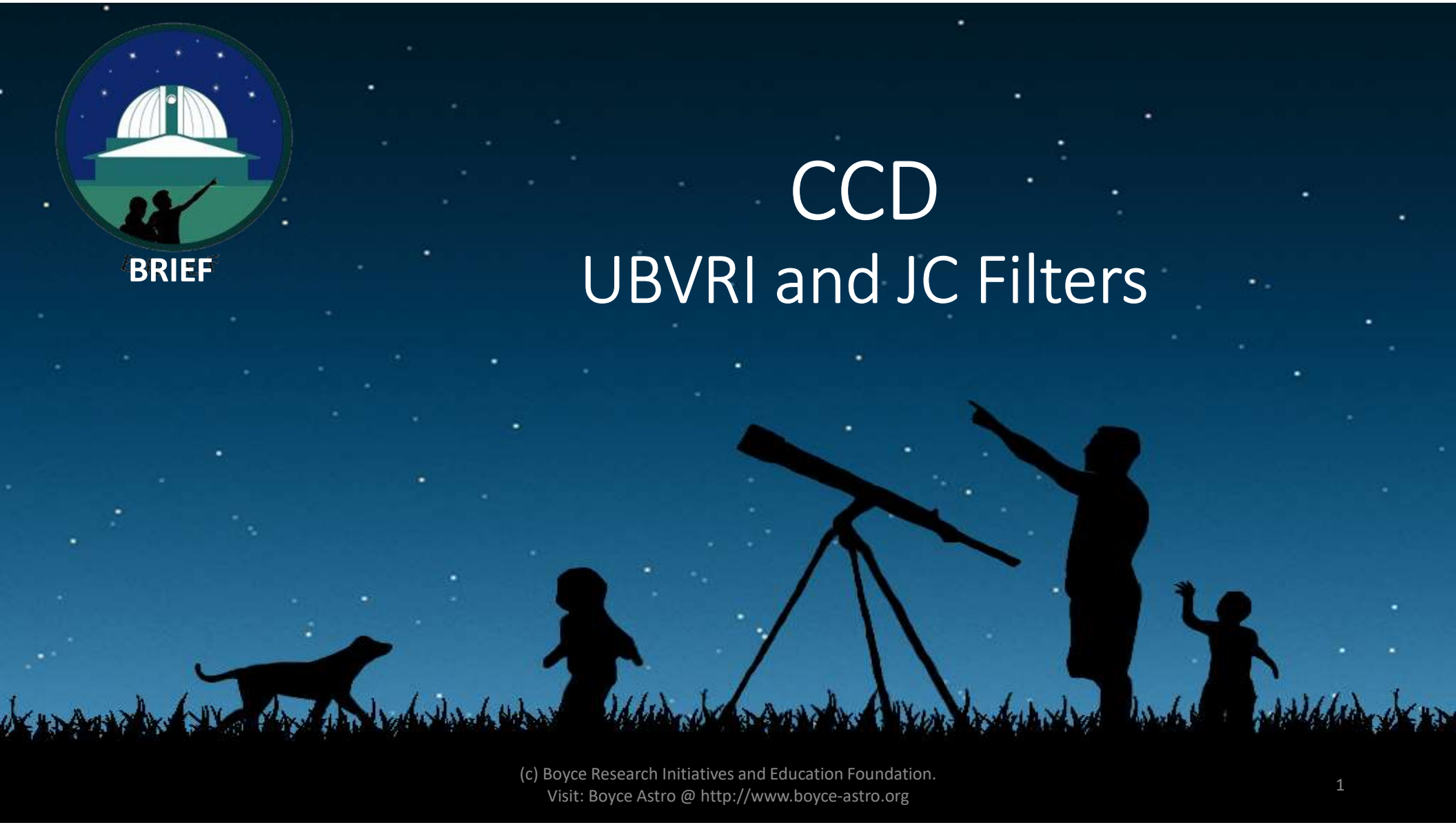
BRIEF

CCD
UBVRI and JC Filters

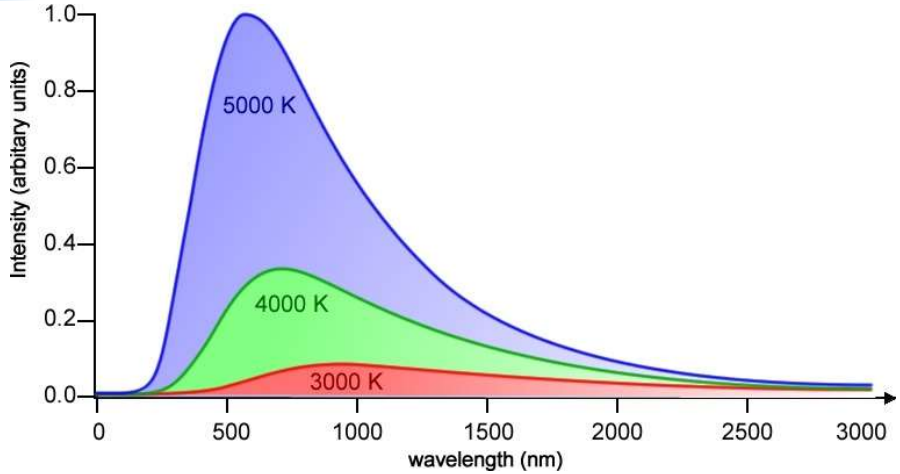


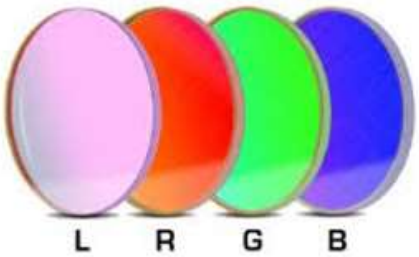
Overview

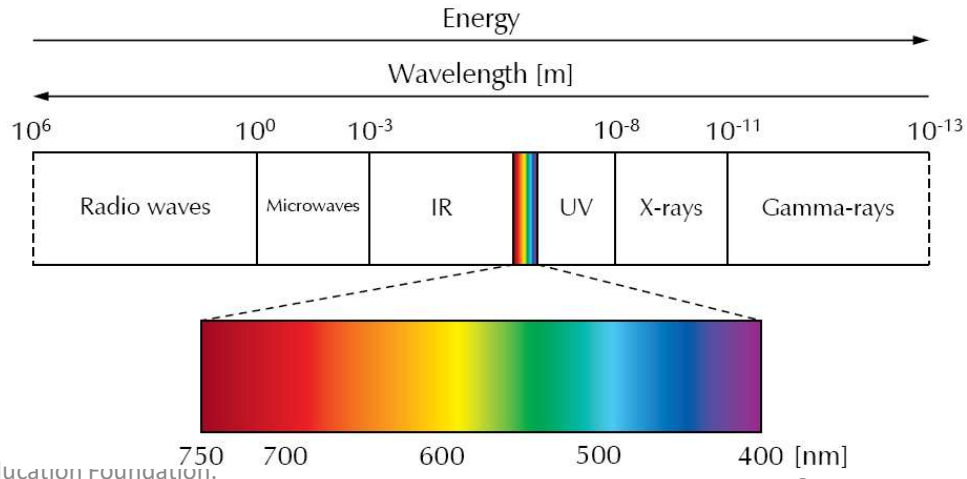
Here we discuss one of the two standardized filter sets that you will use in BRIEF projects: Johnson/Cousins

Review

In the video for CCD Filters Overview, you learned about Black Body Radiation and Wien's Law of Displacement, and how filters can be used to isolate EM bandpasses.







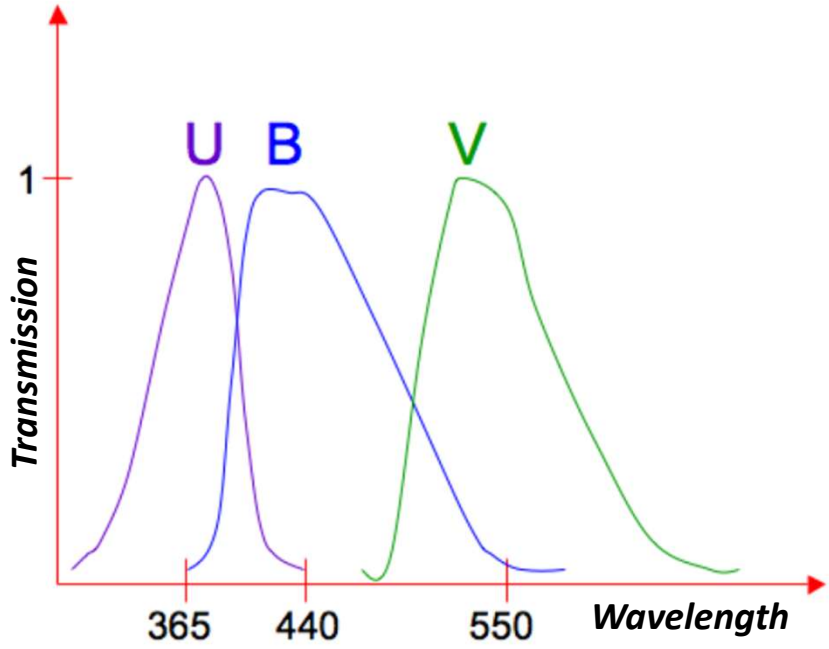
UBV Color System

The UBV system was first established by Johnson and Morgan in 1954 to classify stellar types by their colors

By comparing where the magnitude of a star (thus its Flux) peaks in different filter types, you can find where the star produces most of its energy, and thus its Spectral Type: Ex. O, B, A, F, G, K, M

The bandpasses were selected so the mean wavelengths are:

364 nm for U
442 nm for B
540 nm for V



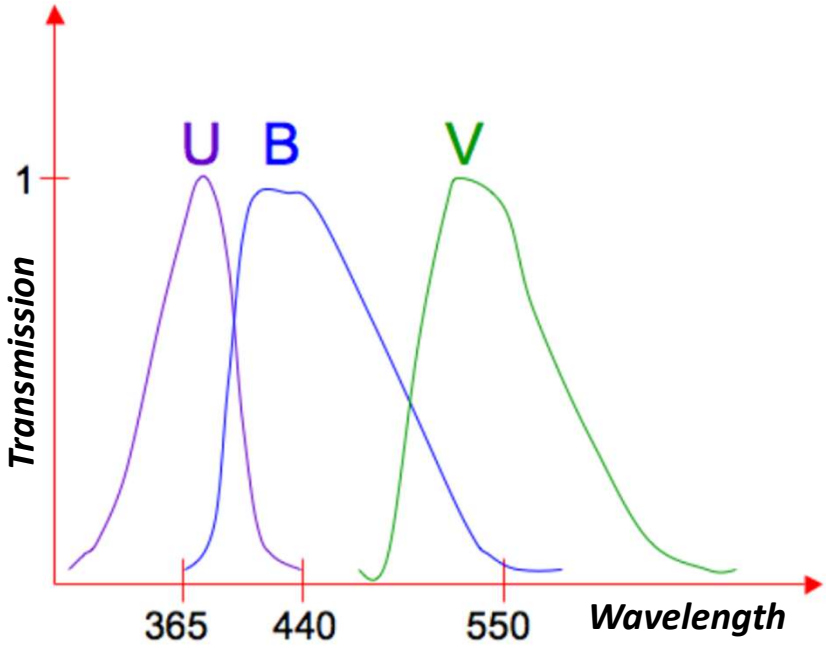
UBV Color System

Zero points were calibrated in the B−V (B minus V) and U−B (U minus B) color indices for A0 main sequence stars not affected by interstellar reddening.

The UBV system has some disadvantages:

The short wavelength cutoff that is the U filter is defined mainly by the terrestrial atmosphere rather than the filter itself

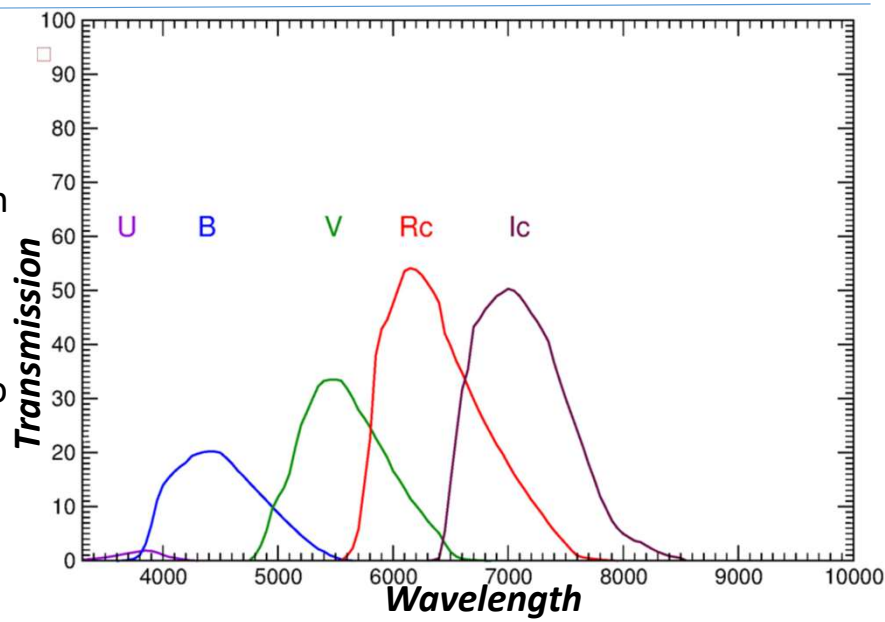
Therefore, observed magnitudes can vary with altitude and atmospheric conditions.



UBV Color System, Introducing the Rc and Ic

The UBV system did not reach well into the Red side of the spectrum

In 1973, Cousins refined Johnson's earlier model of R and C and introduced the Rc (670nm) and Ic (800nm). The subscript c stands for Cousins and nowadays is often removed, with R and I referring to the Cousins standard coupled with the Johnson UBV.



CCD Filters - UBVRI and JC

Johnson Cousins System

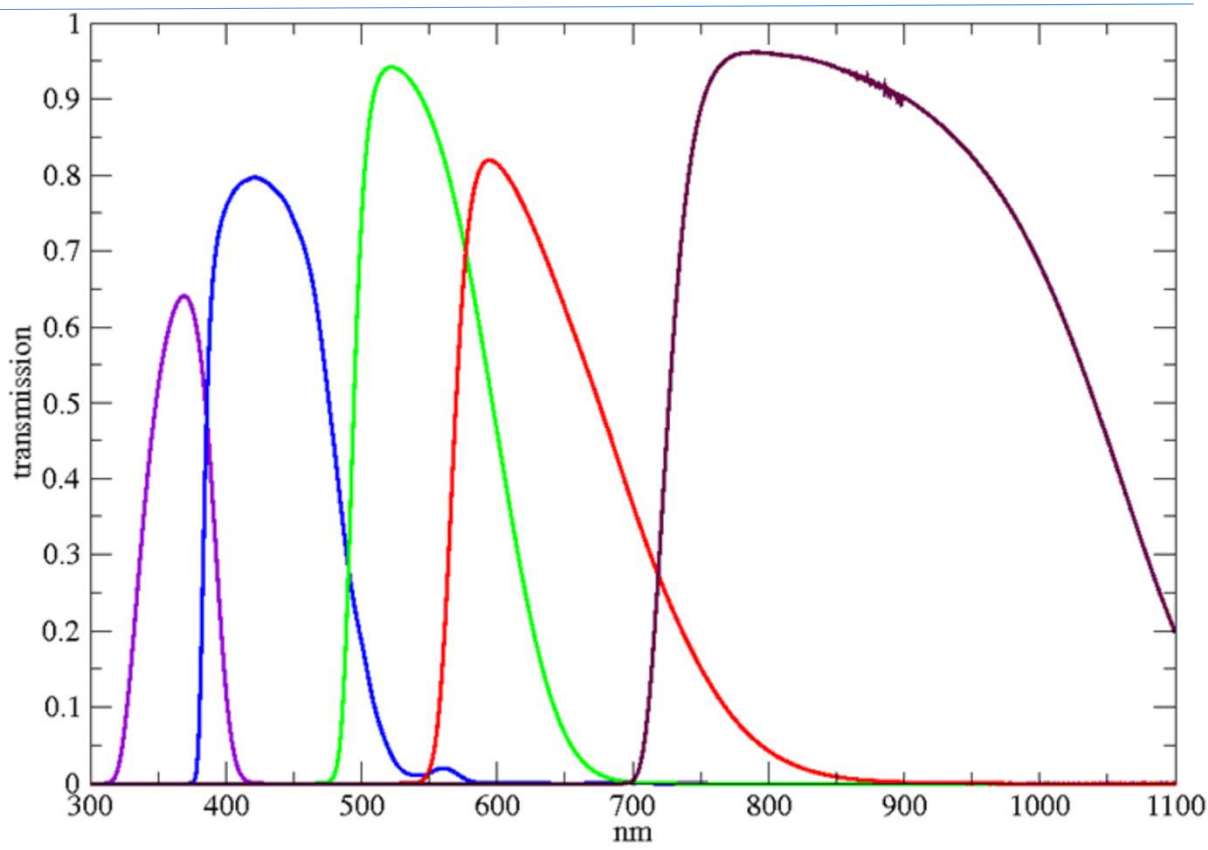
U: Effective central wavelength 365.6nm

B: Effective central wavelength 435.3nm

V: Effective central wavelength 547.7nm

R: Effective central wavelength 634.9nm

I: Effective central wavelength 879.7nm



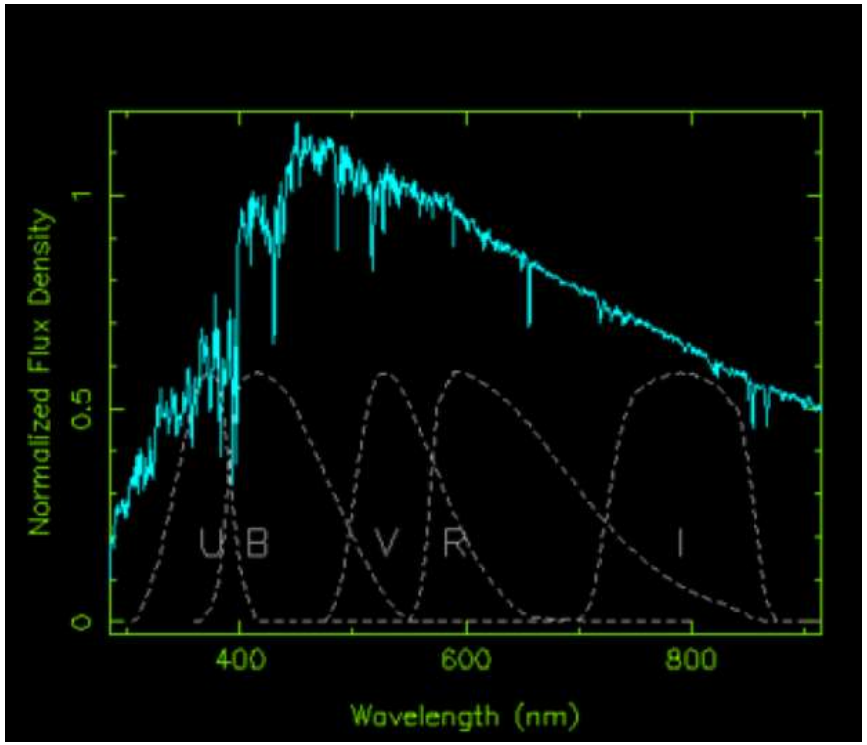
UBVRI System

The most commonly used system with large network of standard stars

Cover all of the visual spectrum and some on the shorter and longer sides

This wide spectrum approach enables the measurement of faint objects

Disadvantage is that the bandpasses overlap which leads to difficulties in interpreting the results



Questions?