

# TYPES OF NEBULAE

THERE ARE THREE BASIC TYPES OF NEBULAE :

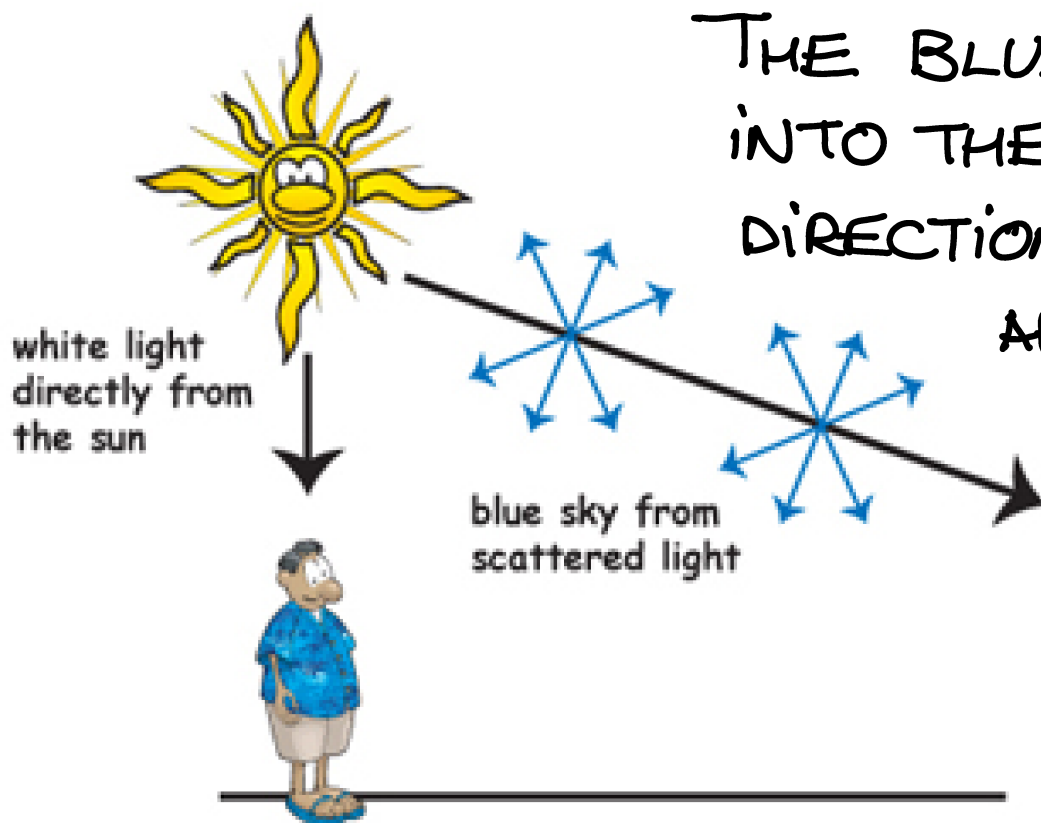
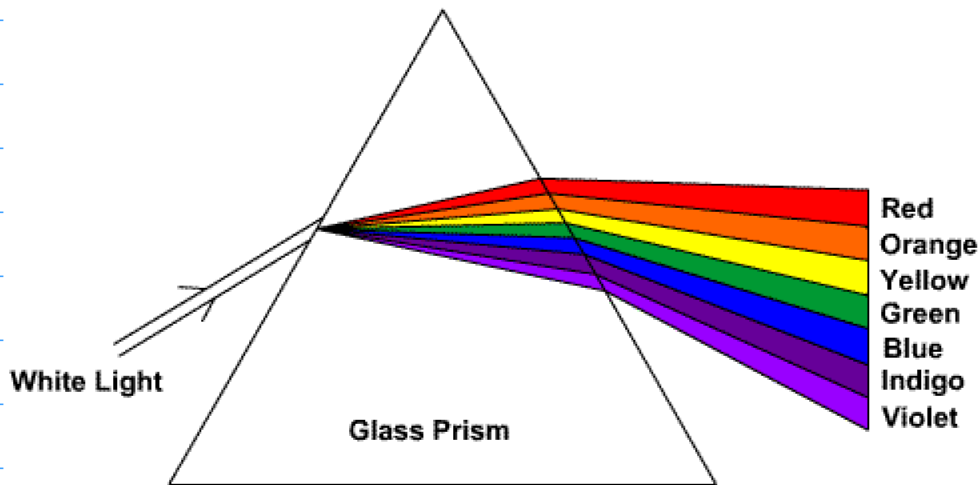
1)



REFLECTION NEBULA (BLUISH IN COLOR). IT IS BLUE FOR THE SAME REASON THAT THE SKY

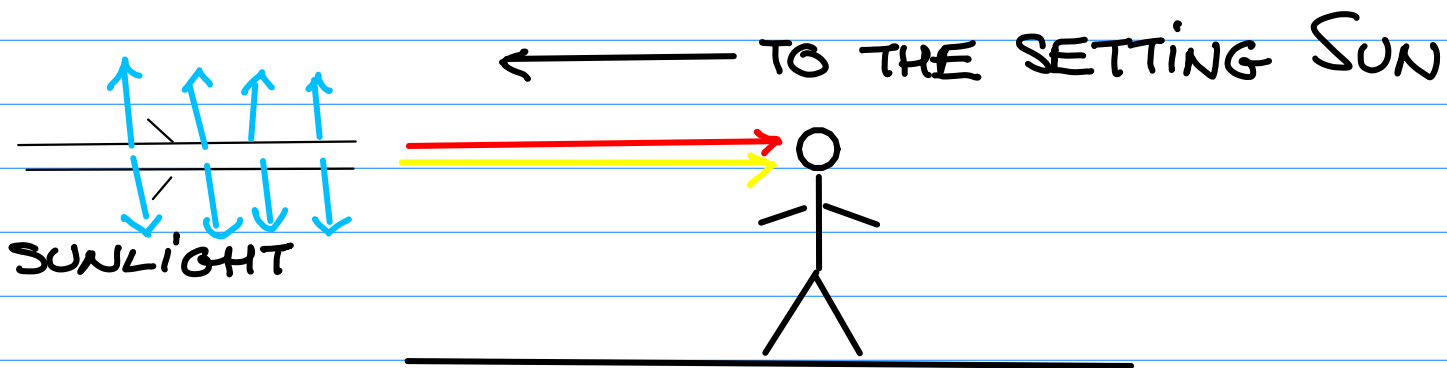
APPEARS BLUE ON A CLEAR SUNNY DAY:

THE DUST PARTICLES SCATTER THE BLUE LIGHT MORE EFFICIENTLY THAN THE LONGER WAVELENGTHS (E.G. RED):

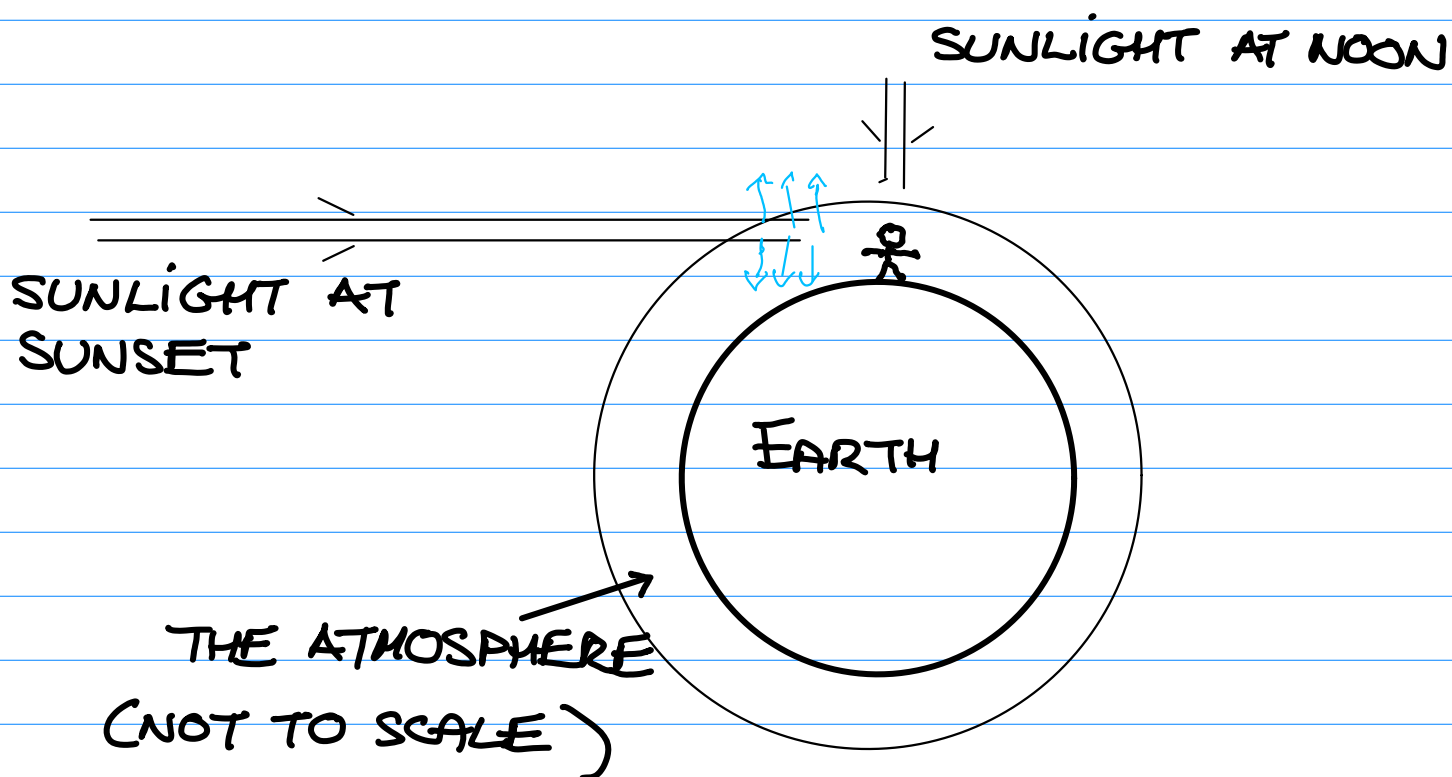


THE BLUE LIGHT COMES INTO THE EYE FROM ALL DIRECTIONS AND THE SKY APPEARS AS BLUE

THE SUNSETS (AND SUNRISES) ARE RED FOR THE SAME REASON:

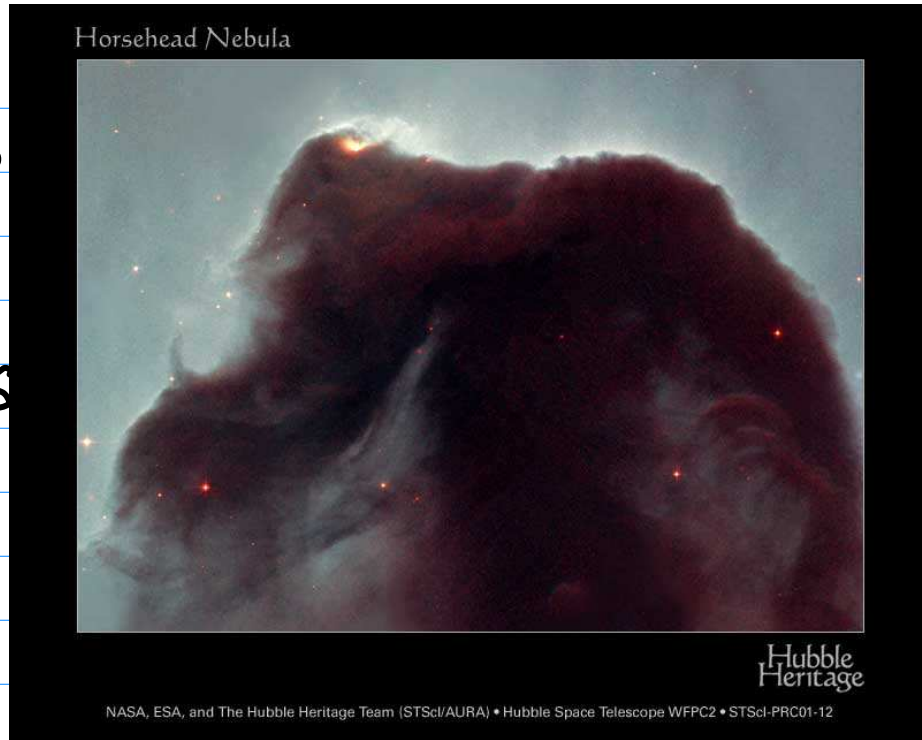


THE BLUE LIGHT IS SCATTERED OUT BY THE TIME IT REACHES THE EYE AND ONLY THE LONGER WAVELENGTH (RED AND YELLOW) SURVIVE THE TRIP.

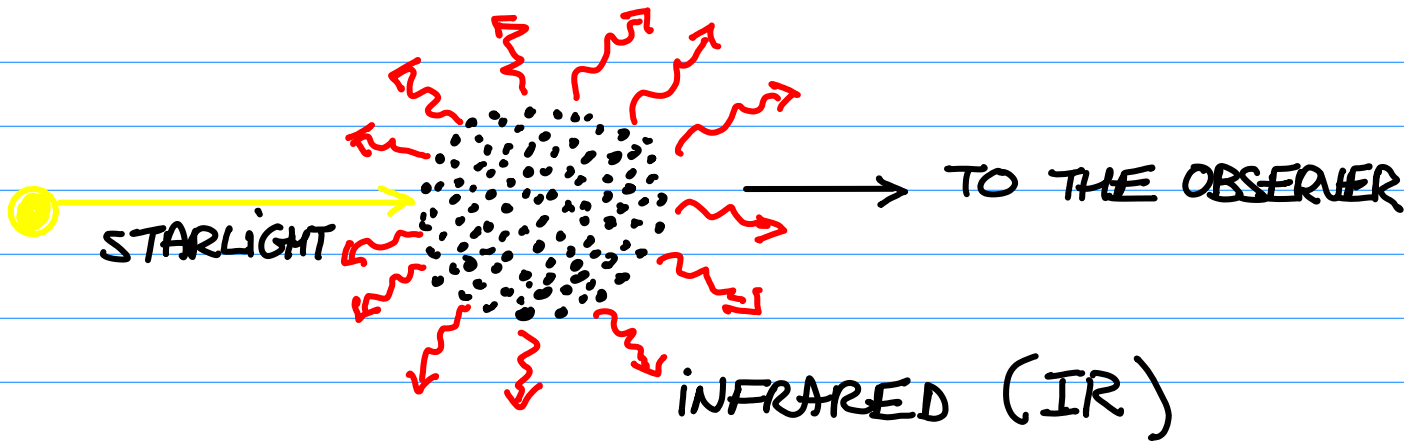


## 2) DARK NEBULAE

HORSEHEAD  
NEBULA AT  
VISIBLE  
WAVELENGTHS



THE DUST PARTICLES IN THE NEBULA BLOCK THE STARLIGHT OF THE STARS BEHIND THE NEBULA GIVING THEM A DARK APPEARANCE:



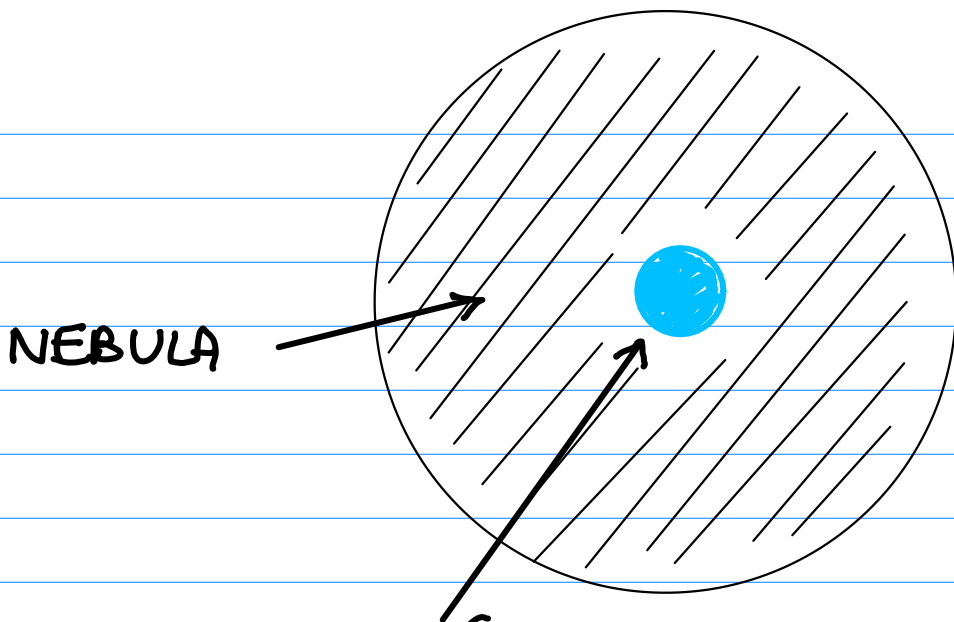
THE DUST PARTICLES ABSORB THE STARLIGHT AND THE ABSORBED ENERGY IS REEMITTED IN IR. THUS, A DARK NEBULA COULD BE OBSERVED IN IR USING THE IR DETECTORS:

# HORSEHEAD NEBULA AT IR-WAVELENGTHS



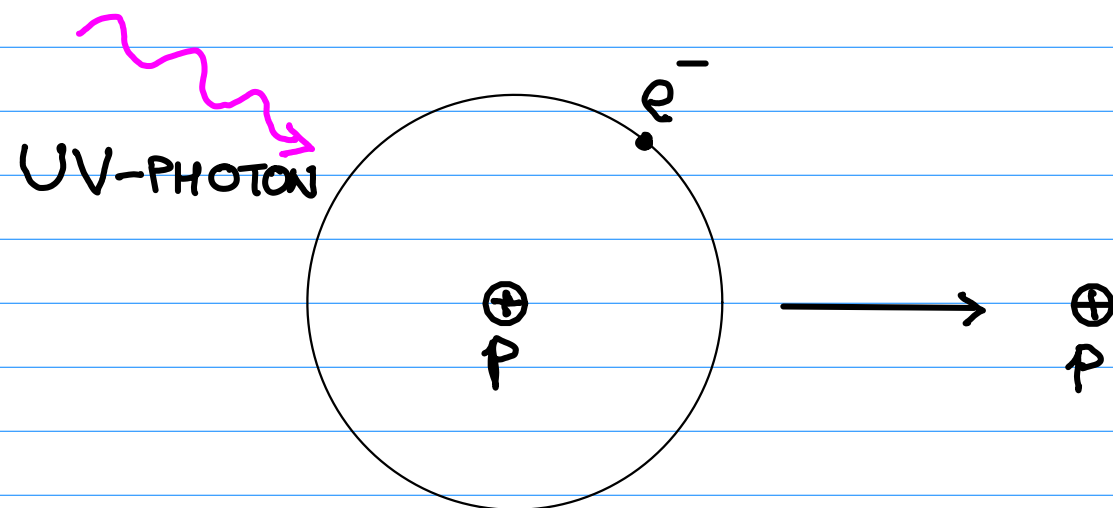
## 3) EMISSION NEBULAE (REDDISH IN COLOR)





HOT (O- OR B- SPECTRAL CLASS),  
LUMINOUS YOUNG STAR; IT EMITS A  
LOT OF ENERGY AT UV (ULTRAVIOLET)  
WAVELENGTHS

THE HIGH ENERGY UV PHOTONS IONIZE  
THE HYDROGEN ATOMS IN THE NEBULA:



NOT BOUND  $\rightarrow$  e<sup>-</sup>  
TO THE PROTON

A PROTON AND ELECTRON THEN RECOMBINE INTO THE NEUTRAL HYDROGEN ATOM WITH THE ELECTRON IN A HIGHER ENERGY (EXCITED) STATE. THE ELECTRON THEN DROPS TO A LOWER ENERGY LEVEL WITH EMISSION OF A PHOTON (FLUORESCENCE). THE EARTH'S ATMOSPHERE PASSES THROUGH THE RED HYDROGEN SPECTRAL LINES GIVING THE NEBULA A REDDISH COLOR.