

Why is the sky blue?

An approximate answer may be given as follows:

The expression for the power radiated by a dipole oscillator is given by:

$$\langle P \rangle = \frac{\mu_0 p_0^2 \omega^4}{c 12\pi}$$

Sunlight passing through the atmosphere stimulates atoms to oscillate as dipole radiators.

Because of the ω^4 dependence in the above equation much more blue power is radiated than red (lower ω).

$\omega_{\text{blue}} \sim 1.5 \omega_{\text{red}}$, therefore $(1.5)^4 = 5$ times more blue light is radiated than red.

In addition because electromagnetic waves are transverse oscillations then the dipole will oscillate in a direction perpendicular to the direction of the sun's rays. Thus looking vertically upward at sunset (on a clear day) we should see blue sky with the polarisation of the light perpendicular to the direction to the sun.