

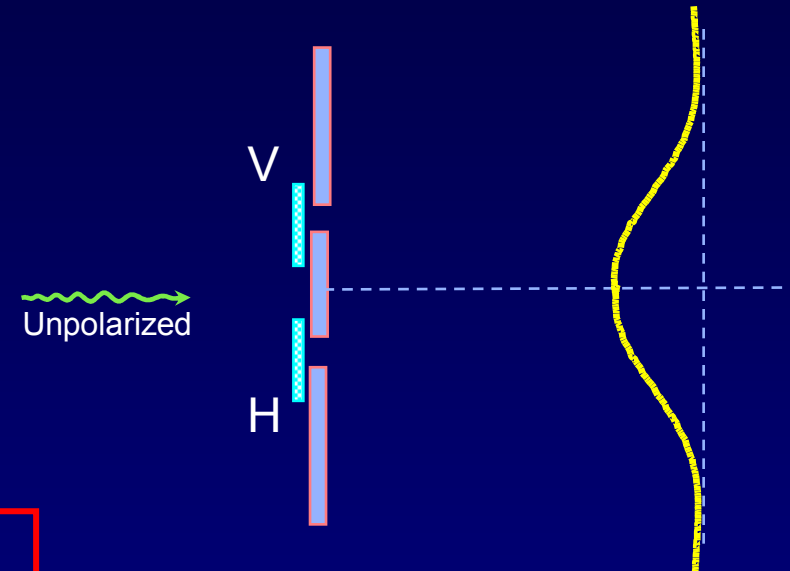
Solution

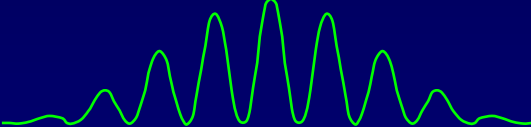
Let's modify the 2-slit experiment a bit. Recall that EM waves can be polarized – electric field in the vertical or horizontal directions.

Send in unpolarized photons.

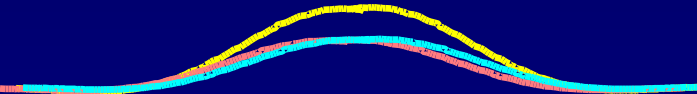
Cover the upper slit with a vertical polarizer and cover the lower slit with a horizontal polarizer

Now the resulting pattern will be:



a) $|\psi_1 + \psi_2|^2$ 

The graph shows a green wave with multiple peaks and troughs, representing an interference pattern.

b) $|\psi_1|^2 + |\psi_2|^2$ 

The graph shows a smooth, single-peaked curve with a red and a blue line overlaid, representing the sum of two individual slit patterns without interference. This entire block is enclosed in a red box.

The photon's polarization labels which way it went.
Because the two paths are in principle distinguishable there is no interference.

Note, that we don't actually need to measure the polarization.
The mere possibility that one could measure it destroys the interference.

Bonus Question: How could we recover the interference?