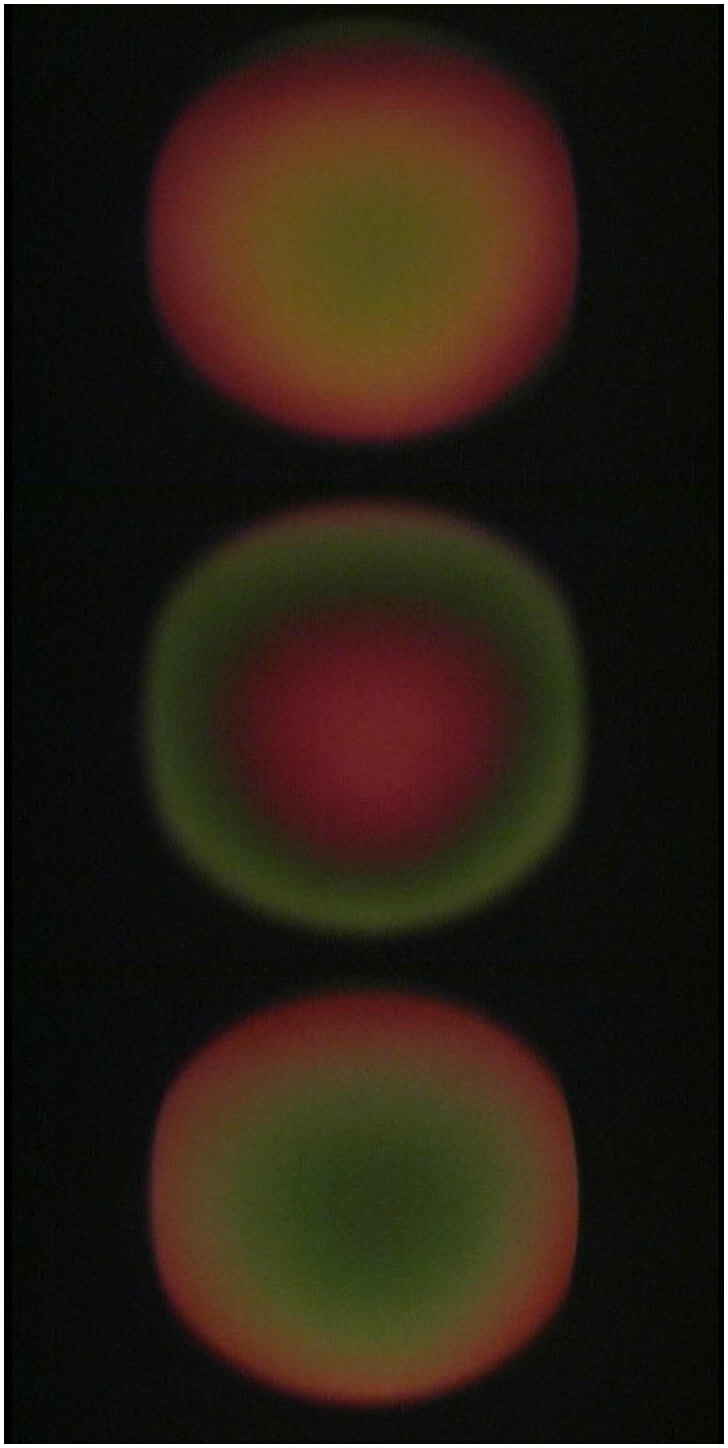
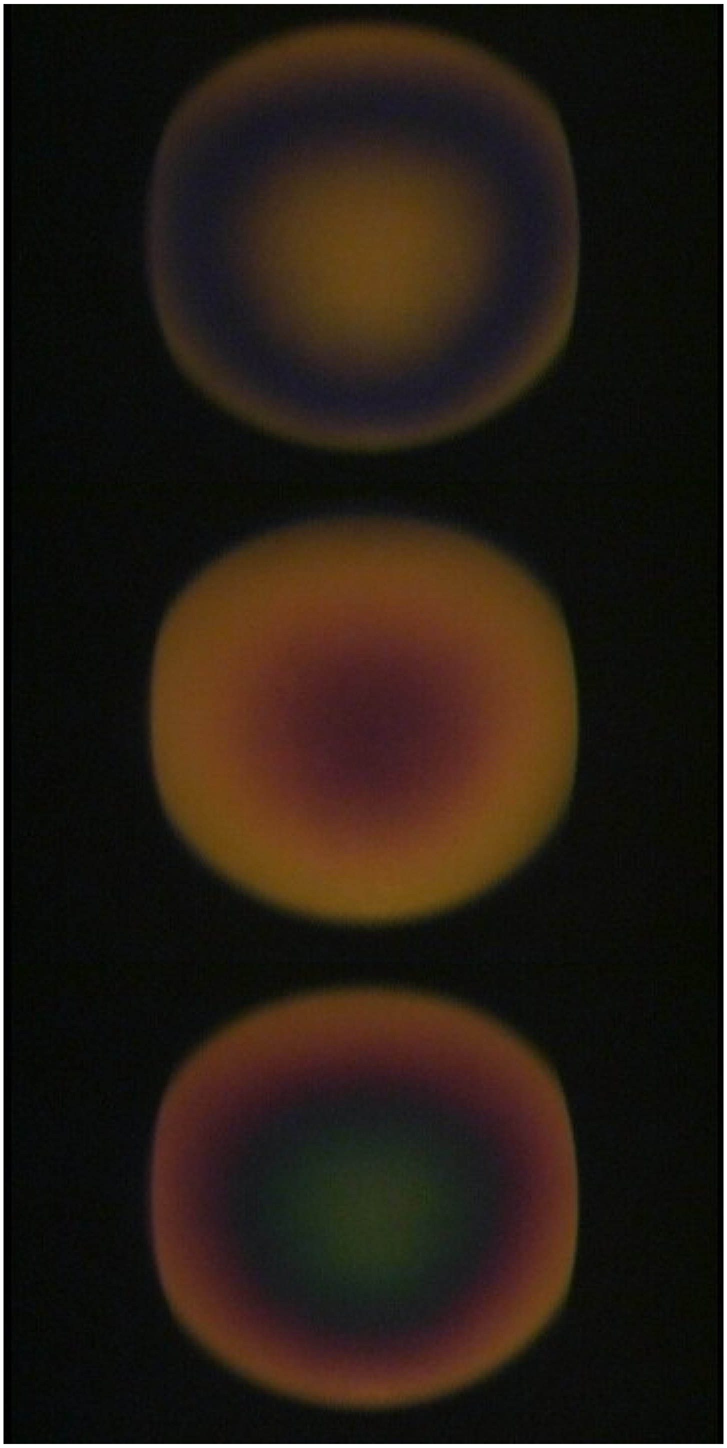
Answer #225

The answer is: (f) yellow, (e) magenta, and (d) cyan, as seen in the series of still photographs below, and in a series of videos of the mirror moving outward (available in Real Media, QuickTime and Windows Media.) or of the mirror moving inward (avialable in Real Media, QuickTime and Windows Media.) The upper row of photographs below shows the light interference pattern as the moveable mirror is moved outward, and the lower row of photographs shows the pattern as the mirror is moved inward. They are different in that the color of the central region expands out from the center (when the mirror is moved in) or comes in from the outside (when the mirror is moved out).





Beginning at the equal path length position, as the mirror is moved *either* outward or inward and the path length difference becomes increasingly longer, first the blue (shortest wavelength), then the green (mid-wavelength), then the red (longest wavelength) become out of phase, causing the *negative* colors in the interference pattern to progress from yellow (minus blue) to magenta (minus green) to cyan (minus red).

Also available is a (very long) video (in Real Media, QuickTime and Windows Media.) which shows the mirror moving through the entire coherence region for the white light interferometer, that is, the entire region of path length difference over which the interference is sufficiently coherent as to allow color to be seen and identified. Beyond these mirror position limits, the interference is so complicated thatit is impossible to see any coloration with the naked eye, although a spectrometer would show the exact spectrum.

For questions and comments regarding the *Question of the Week* contact
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given on the Lecture-Demonstration Home Page.