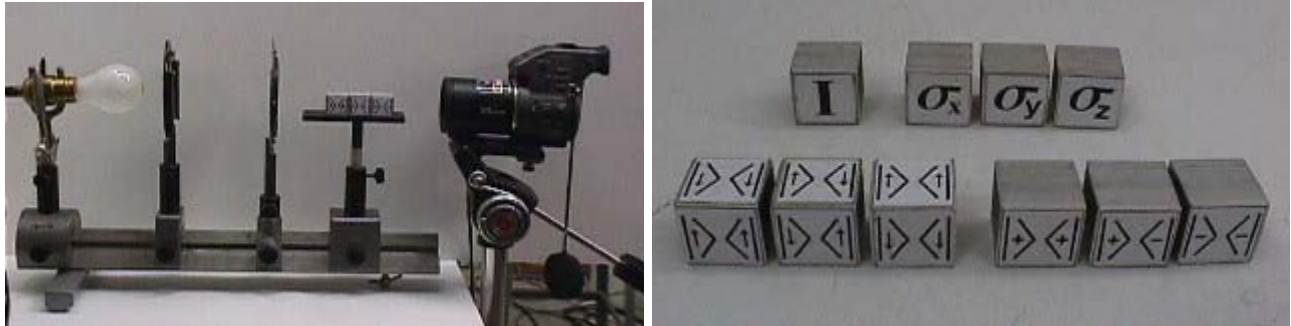


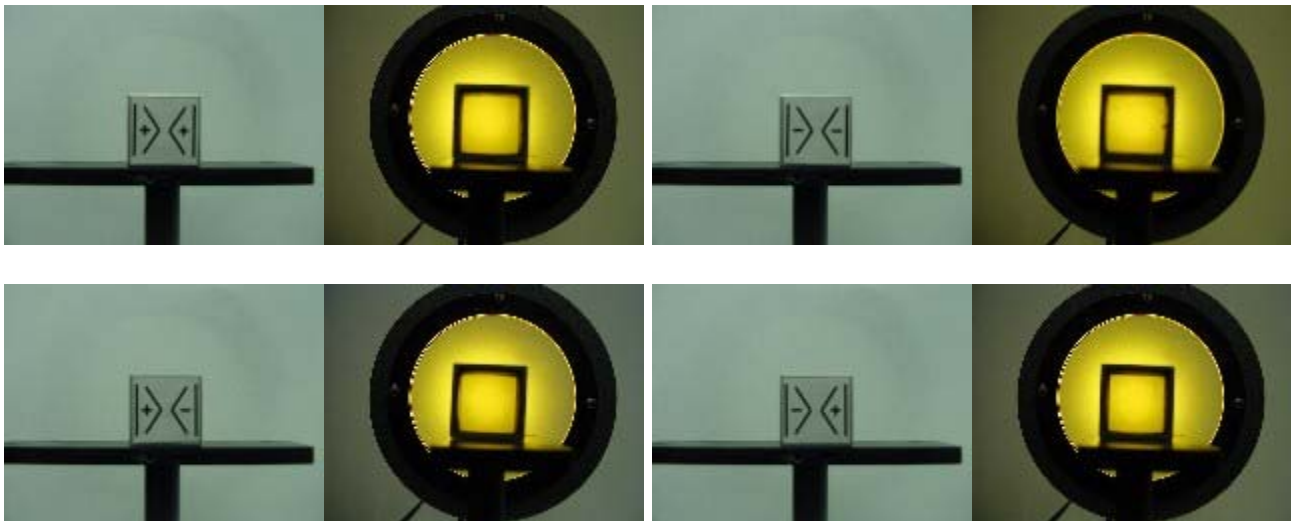
Question #291

This question is a follow-up for [Question #290](#). For this question we will use the optical system seen at the left below, consisting (left to right) of a (white) light, an etched glass screen to diffuse the light, a (negative) yellow filter, a variety of optical elements housed in small aluminum cubes open on two ends, such as the ones shown in the photographs, and a digital camera, looking backward (through the little cubic optical elements) along the optic axis of the system.



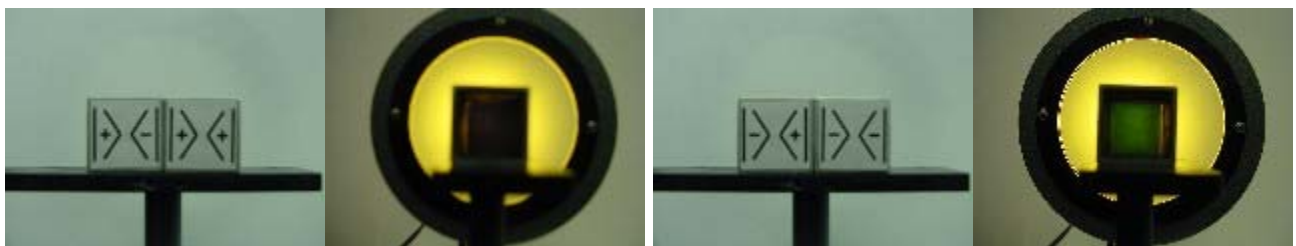
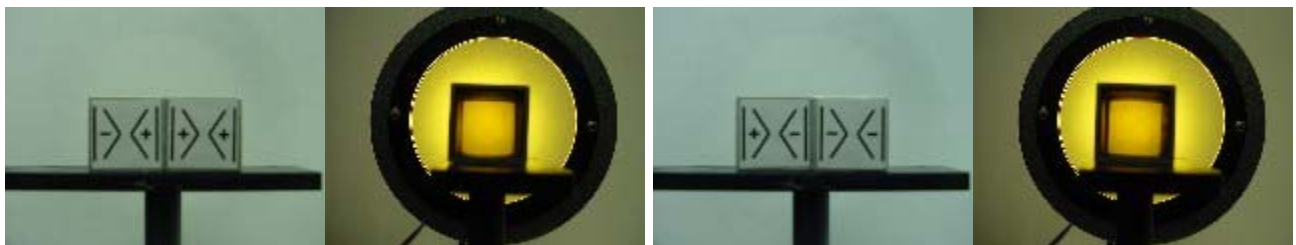
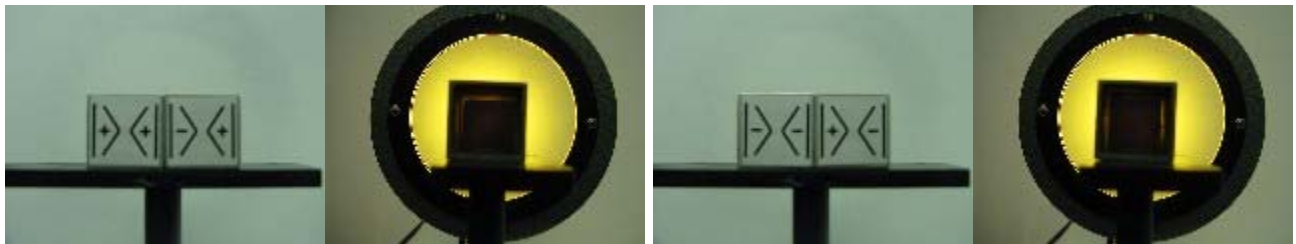
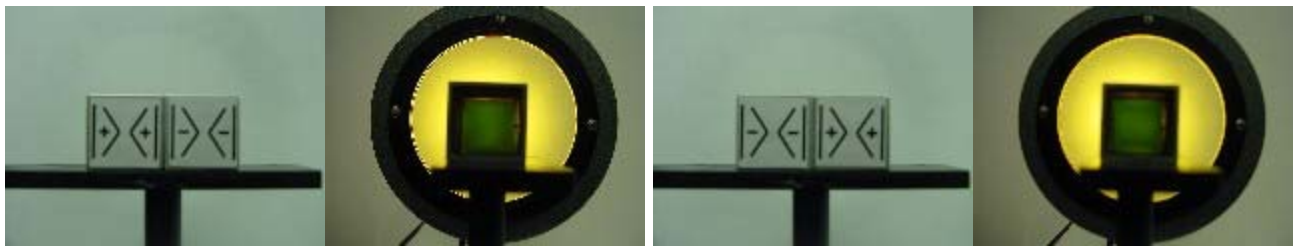
We now turn our attention to another set optical components, labelled with + and - symbols rather than up and down vector arrows. This set is seen in the photographs below.

Here are the individual cubes and how the light passes through them.

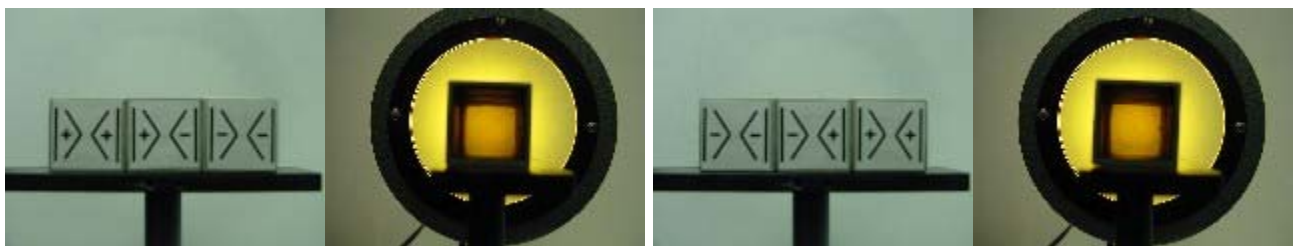


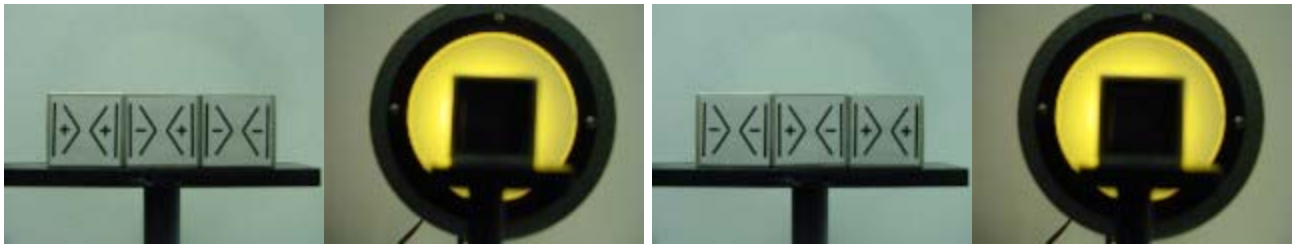
As with the "up-down" cubes in Question #290, the "+-" and "-+" cubes are the same cube, which has been rotated end-for-end in the photographs above.

Placing two of the cubes with their "+" or their "-" sides together allows light to pass. However, placing opposite signs together results in no light passing. This is seen in the photographs below.



Here are some combinations of three blocks.





What is in each of the blocks? To help we offer a selection from the following.

Part 1: What is in the cubes marked "+" and "--"?

- (a) a polaroid (specify the alignment)
- (b) a quarter-wave plate (specify the alignment).
- (c) a half-wave plate (specify the alignment).
- (d) a combination of the above (specify).
- (e) something else (specify).

For this question assume that the dark green color in two of the situations is the same as the dark "no light" situation.

Part 2: What is in the cube marked "+-".

- (a) a polaroid (specify the alignment)
- (b) a quarter-wave plate (specify the alignment).
- (c) a half-wave plate (specify the alignment).
- (d) a combination of the above (specify).
- (e) something else (specify).

Characterize properties of light created by each of the blocks.

Click here for [Answer #291](#) after October 7, 2007.

[Question of the Week](#)

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For questions and comments regarding the *Question of the Week* contact [Dr. Richard E. Berg](#) by e-mail or using phone number or regular mail address given on the [Lecture-Demonstration Home Page](#).