Use a plastic tube approximately 8 cm in diameter and 70 cm long, filled with water to which a small amount of milk has been added. (See Note 1.) Place the tube on the lecture table so that the polaroid mount at the side of the tube is on the student's side. Place in the lantern a 2" square slide having a 1" diameter hole, and adjust the lantern so that the light beam is horizontal and essentially parallel. Set the lantern with its lens roughly 2" from the polaroid mount at the end of the tube. The light reaching the students is that which is scattered, and for those on a line perpendicular to the tube the light has been scattered at 90°.

Place a polaroid in the mount at the side of the tube. By rotating the polaroid, show that the scattered light is significantly plane polarized. (See Note 2.)

Now place a polaroid in the mount at the end of the tube. Rotate the polaroid and note that the tube appears alternately light and dark (in horizontal lines) to those viewing the tube at anywhere near 90° to the primary beam. By viewing the tube from the bottom, the view seen in the mirror, note that the alternate light and dark lines are 90° apart.

Notes:— (1) The amount of milk used for scattering is rather critical. To the approximately 3.5 liters of water required to fill the tube, from 0.30 to 0.35 gm of milk should be added. This represents a concentration of approximately 1 part in 10,000 by weight. (2) Light scattered once at exactly 90° is completely plane polarized. Because of considerable multiple scattering, light scattered here, even at exactly 90°, is only partially plane polarized.