Double-Refracting Calcite Crystals

POLARIZATION

A small hole in a sheet of cardboard is illuminated and its image projected on a screen. When a calcite crystal is placed over the hole, two spots of light appear on the screen. As the crystal is rotated, one spot stays fixed while the other revolves around it. If a polarizing sheet is added to the path of light and rotated, the two images may be made to disappear alternately. A Nicol's prism consisting of a double refracting crystal cut along a diagonal and glued back together is also available. The ordinary ray suffers total internal reflection at the boundary, whereas the extraordinary ray is transmitted.
Doubly Refracting Calcite Crystals

This setup without the polaroid gives two images—the ordinary ray going thru the center of the crystal and the extraordinary ray that is refracted more, that emerges elsewhere. By rotating the crystal the extraordinary ray travels around the ordinary. With a Polaroid installed one can show how one ray can be extinguished at some angle and then the other at some other θ. This is done just using one crystal. If two are used four images emerge, two of which can be extinguished at one setting of the polaroid etc.

[Depending upon the way the two Calcite crystals are placed with respect to one another—two or four images will be seen]—Rotate one
Calcite Crystals

PCX 18
Dichroic
Polarizer

Projection
Lens
Calcite
Crystal

10 26 33 56 70 cm.
By rotating the calcite crystal 2 or 4 mages may be obtained. Two can be distinguished by rotating the polarizer or the crystal.