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Supporting information for article:

3D-printing Aids in Visualizing the Optical Properties of Crystals

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S1. Contents

The Supplementary Material contains a zip file that includes two folders named Uniaxials and Biaxials. The Uniaxials folder contains three folders named Fig3, Fig5 and Fig7, these are named after the corresponding figures and contain the STL files to print the models that appear in the figures. Similarly the Biaxials folder contains four folders, named Fig8, Fig10, Fig11 and Fig12, also named after the corresponding figures containing the STL files to print the models that appear in those figures. Every folder contains two folders, one containing the STL files of the ellipsoid pieces without holes and another one with cylindrical holes, these holes are intended to insert magnets within them to easy the assembling and disassembling of the ellipsoids. Please note that to get the complete model the different parts (individual STL files) will have to be printed more than once because of the symmetry of the dissection puzzle (except for the model depicted in Figure 12).

S2. Instructions for use

The STL files can be opened with any 3D printing software. The files can be scaled to produce ellipsoid of the desired size, remember to apply the same scaling factor to all the pieces belonging to a given ellipsoid. Default sizes of the ellipsoid fragments bearing holes are designed to hold barium ferrite magnetic discs (Ø 10 mm, high 3 mm). Pay attention to polarity when inserting them, the magnets can be stuck in the holes using conventional PVC cement; to get a better finish you can spray paint the pieces of the ellipsoid. Please note the precise instructions for every folder:

-Fig3: contains two files:

Fig3_prolate.STL: print this file 8 times to produce a prolate unixial ellipsoid. This can be disassembled to show the circular and principal sections. The puzzle is useful to show the case of birefringence producing two ordinary rays.

Fig3_oblate.STL: print this file 8 times to produce a oblate unixial ellipsoid. This can be disassembled to show the circular and principal sections. The puzzle is useful to show the case of birefringence producing two ordinary rays.

-Fig5: contains six files, print every file twice to produce a prolate uniaxial ellipsoid. This can be disassembled to show the circular, principal and random sections. The puzzle is useful to show the general case of birefringence in uniaxial media, producing an ordinary ray and an extraordinary ray.

-Fig7: contains four files, print every file four times to produce a prolate uniaxial ellipsoid that can be inserted within a hexagonal prism. Please note that no version with holes has been produced, the puzzle pieces can be stuck using small quantities of Blue-tak type adhesive.

-Fig8: contains two files, print every file four times to produce a biaxial ellipsoid. This can be disassembled to show the three principal sections of the biaxial ellipsoid. The puzzle is useful to show the case of birefringence producing two ordinary rays in a biaxial medium.

-Fig10: contains eight files:

Fig10-_1 to Fig10-_4 have to be printed four times to produce a biaxial ellipsoid. This can be disassembled to show the two circular sections and to locate the corresponding optical axes. In this case the $2V_X$ angle is acute.

Fig10+_1 to Fig10+_4 have to be printed four times to produce a biaxial ellipsoid. This can also be disassembled to show the two circular sections and to locate the corresponding optical axes. In this case the $2V_Z$ angle is acute.

-Fig11: contains four files, print every file twice to produce a biaxial ellipsoid. This puzzle is useful to show the case of birefringence producing a pair of ordinary and extraordinary rays in a biaxial medium.

-Fig12: contains eight files, print once every file to produce a biaxial ellipsoid. This puzzle is useful to show the general case of birefringence in biaxial media, producing a pair of extraordinary rays.