

PAIR OF BASIC POLARISING FILTER BB84

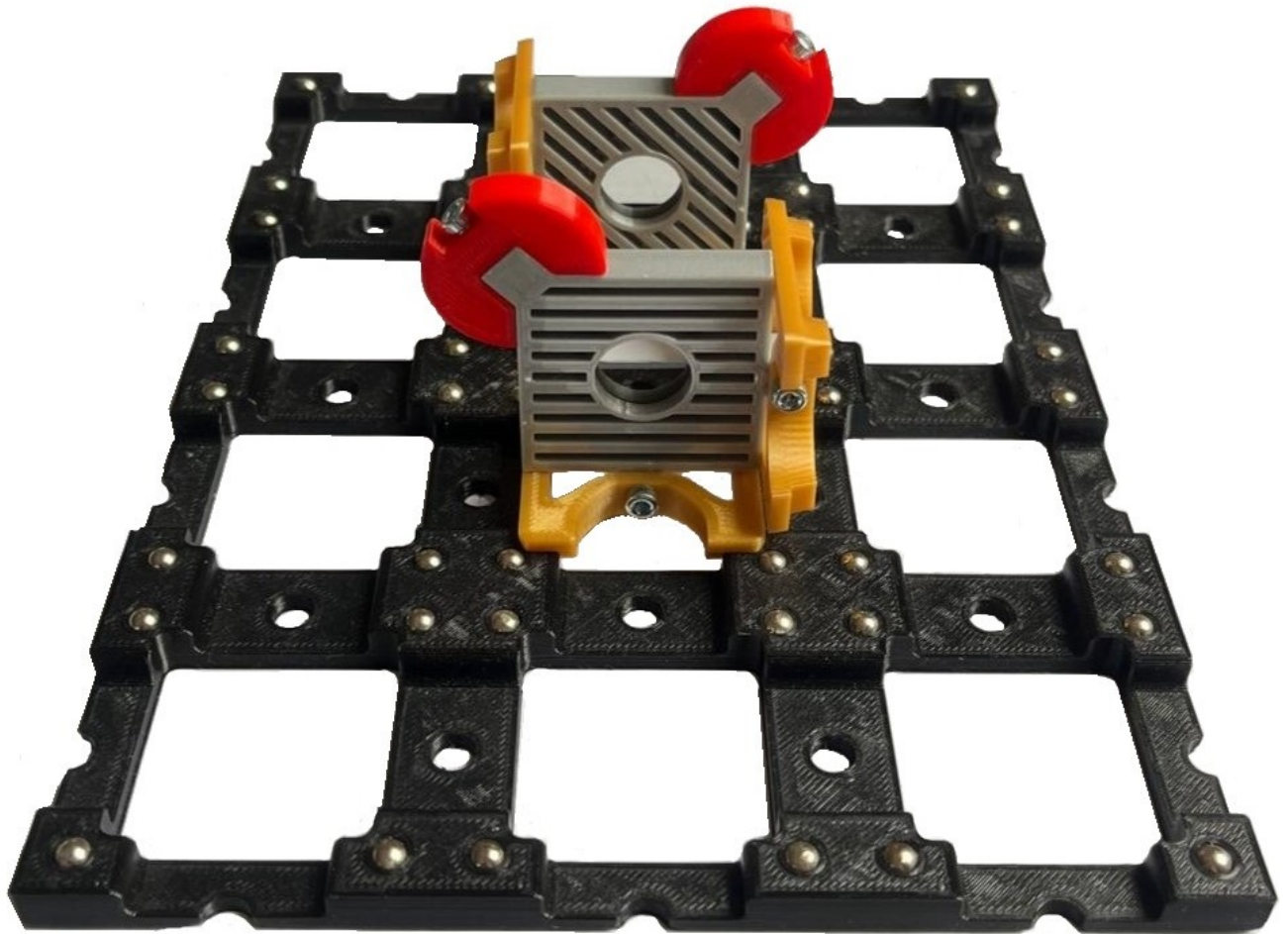


Fig. 1: Pair of polarising filters for the BB84 experiment

INTRODUCTION

In this module two polarising filters are held perpendicular to the grid rotated 45° to each other. These can each be rotated by 90° using the red handle. This is necessary for the BB84 experiment.

EXPERIMENTS

▷ BB84 model experiment - 1 pair

MATERIAL & TOOLS

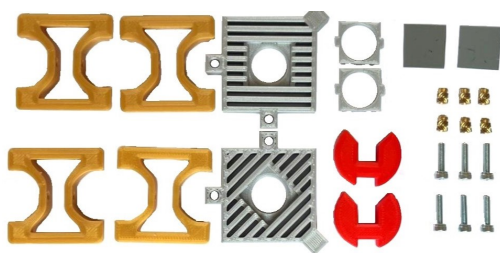


Fig. 2: Material

3D printing

- 4x 01E_Go_V*_basis_polarising_filter_base
- 2x 06A_Si_V*_basis_polarising_filter_cover
- 1x 06B_Si_V*_basis_polarising_filter_centre
- 1x 06C_Si_V*_xbasis_polarising_filter_centre
- 2x 06A_Re_V*_basis_polarising_filter_handle

Other components

- 6x Threaded insert, M3
- 6x Allen cylinder head screw, M3x12
- 2x Polarising filter foil 17 mm x 17 mm

Tools

- ▷ Allen key - 2,5 mm
- ▷ Soldering iron (with melting aid)
- ▷ Scissors (for cutting the polarising filters to size)

EXPLODED VIEW

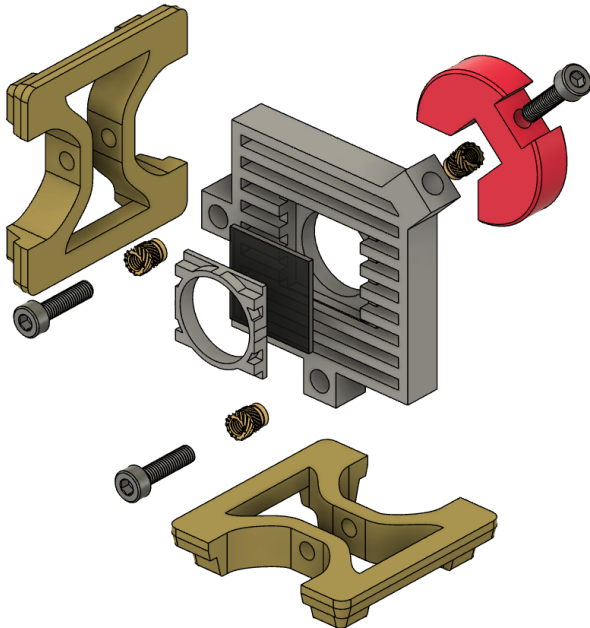


Fig. 3: Exploded view of the polarising filter



Fig. 5: Correctly positioned threaded inserts



Fig. 6: Melted threaded inserts

I. POLARISING FILTER HOLDER

Material

- 2x 06A_Si_V*_basis_polarising_filter_cover
- 1x 06B_Si_V*_+basis_polarising_filter_centre
- 1x 06C_Si_V*_xbasis_polarising_filter_centre
- 6x Threaded insert, M3
- 2x Polarising filter foil 17 mm x 17 mm

- (1) If necessary mount the tip for melting the thread inserts on the soldering iron and heat the soldering iron to 220°C.
- (2) Melt two of the **THREADED INSERT, M3** with the soldering iron into the flat side of the **06C_Si_V*_XBASIS_POLARISING_FILTER_CENTRE** (Figure 4).



Fig. 4: Correctly positioned threaded inserts

- (3) Melt the third **THREADED INSERT, M3** into the opening provided on the side of the xbasis polarising filter (Figure 5).

- (4) Pull the foil from the **POLARISING FILTER FOIL 17 MM X 17 MM** and place it in the opening of the xbasis polarising filter (Figure 7).

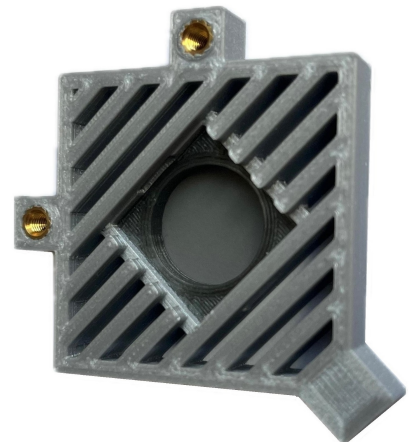


Fig. 7: Polarising filter foil inserted in the holder

Note: Ensure that the polarising filter foil is correctly aligned. To do this, first determine the alignment of the polarising foil. Use the effect of the Brewster angle, e.g. on a glass plate (smartphone) as shown in Figure 8. Hold the foil in front of the reflected polarised light. The orientation of the polarising foil is 0° when the reflected light is absorbed. The orientation of the polarising filter holder will help you with this: if the slots in the holder are aligned vertically, the reflected light

should be absorbed, if they are aligned horizontally, it should be transmitted (Figure 8).

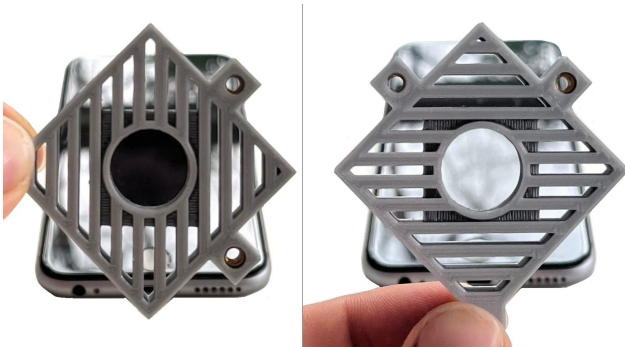


Fig. 8: Polarisation on a glass plate (Brewster angle). The reflected light is absorbed on the left and transmitted on the right.

- (5) Press the 06A_Si_V*_BASIS_POLARISING_FILTER_COVER over the inserted polarising filter with the openings provided into the holder (Figure 9).

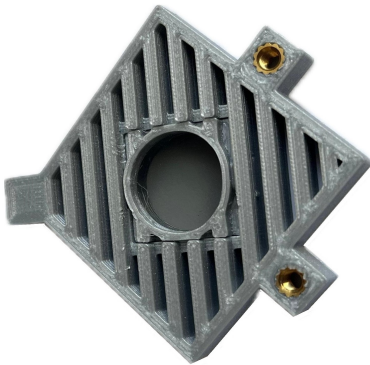


Fig. 9: Filter cover pressed into the holder

- (6) Repeat the steps with the 06B_Si_V*_+BASIS_POLARISING_FILTER_CENTRE .

Note: Ensure that the polarising filter foil is correctly aligned. To do this, first determine the alignment of the polarising foil. Use the effect of the Brewster angle, e.g. on a glass plate (smartphone) as shown in Figure 10. Hold the foil in front of the reflected polarised light. The orientation of the polarising foil is 0° when the reflected light is absorbed. The orientation of the polarising filter holder will help you: if the slits of the holder are aligned vertically, the reflected light should be absorbed, if horizontally, it should be transmitted (Figure 10).



Fig. 10: Polarisation on a glass plate (Brewster angle). The reflected light is absorbed on the left and transmitted on the right.

II. ASSEMBLING

Material

- 1x Finished xbasis polarising filter holder
- 1x Finished +basis polarising filter holder
- 2x 06A_Re_V*_basis_polarising_filter_handle
- 4x 01E_Go_V*_basis_polarising_filter_base
- 6x Allen cylinder head screw, M3x12

- (1) Place a 01E_Go_V*_BASIS_POLARISING_FILTER_BASE on one side of a FINISHED XBASIS POLARISING FILTER HOLDER so that the edges are on top of each other and secure it with a ALLEN CYLINDER HEAD SCREW, M3x12 (Figure 11).

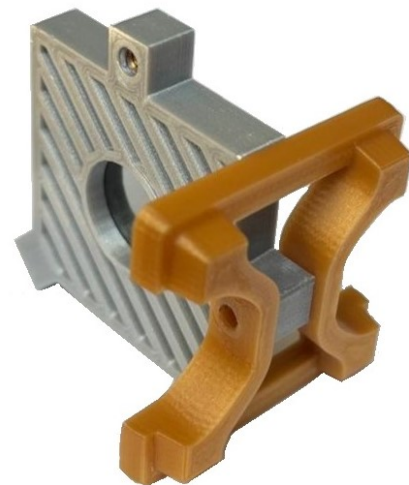


Fig. 11: Correctly positioned base on the polarising filter holder

- (2) Repeat the previous step with the second `01E_GO_V*_BASIS_POLARISING_FILTER_BASE` on the other side of the finished polarising filter holder (Figure 12).



Fig. 12: Correctly positioned base on the polarising filter holder

- `HOLDER` to create the second polarising filter (Figure 15).



Fig. 15: Ready assembled polarising filter



Fig. 13: Attached bases on the polarising filter holder

- (3) Place the `06A_RE_V*_BASIS_POLARISING_FILTER_HANDLE` over the edge on the corner of the polarising filter holder and secure it with a `ALLEN CYLINDER HEAD SCREW, M3X12` (Figure 14).



Fig. 14: Ready assembled polarising filter

- (4) Repeat the steps with the `FINISHED +BASE POLARISING FILTER`