

FLEXING TETRAHEDRAL KALEIDOSCOPES THE VARIOSKOP: A TRANSITION FROM DISORDER TO ORDER

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A tetrahedral kaleidoscope is a kaleidoscope made of four mirrors (instead of the usual three mirrors) and there are only three basic types:

- 1.) The hexahedron or cube with a center angle of 70.5°
- 2.) The rhombic dodecahedron with a center angle of 54.7°
- 3.) The rhombic triacontahedron with a center angle of 37.40°

A continuous function is transformed into a quantified function

If the four mirrors of a tetrahedral kaleidoscope are hinged together so they can be continuously varied from 0° to 180° , we shall call it a varioskop. Each position has its own mirror symmetry. At any random angle we see a mirror image with no order and the reflections overlap. What is common to all of the three basic types of varioscopes is that in the course of moving one can only observe a complete symmetrical image when one of the dihedral angles is set at exactly 120° . The symmetrical mirror positions for the varioscopes are as follows:

- 1.) 3-fold axis ($120^\circ/120^\circ$) for the cube varioskop with a square opening (90° face angle). (The cube varioskop has also a beautiful pseudo-symmetrical 4- and 5-fold axis position with 90° and 144°)
- 2.) 3- and 4-fold axis ($120^\circ/90^\circ$) for the rhombic dodecahedron varioskop with a rhombic opening (face angle of 109.5° and 70.5°).
- 3.) 3- and 5-fold axis ($120^\circ/72^\circ$) for the rhombic triacontahedron varioskop with a rhombic opening (face angle of 116.6° and 63.4°). The apex of the 4-sided cone can be cut in several ways and the aperture creates many different images, such as Kepler stars.