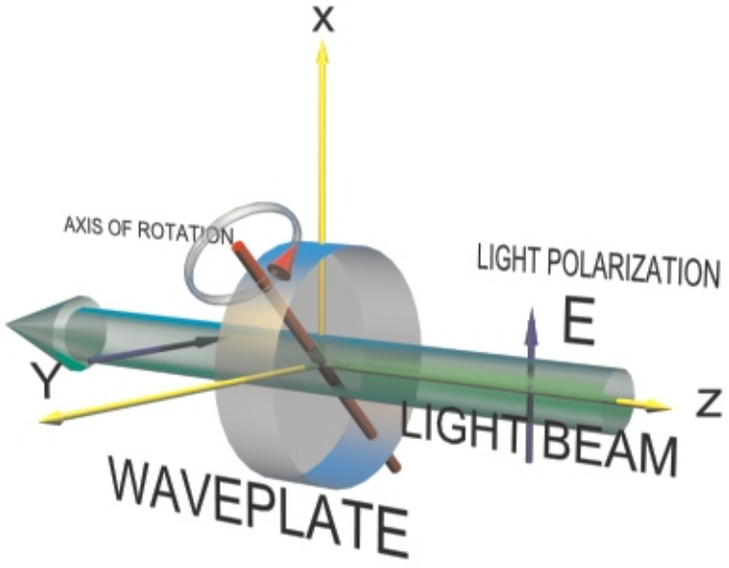
ALPHALAS

TUNABLE TRUE ZERO-ORDER PHASE RETARDATION PLATES

(Patent Pending)

A novel type of phase retardation plates (wave plates) representing a breakthrough in light polarization measurement and control are now commercially available. The UVIR type plate can be adjusted to a quarter or half wave phase retardation for an ***arbitrary*** wavelength from **150 nm** (vacuum-UV) to **6000 nm** (far infrared) and the FIR type from **1 µm** to **21 µm**. **Thus, the new plates *replace tens of ordinary phase retardation plates* required to cover these ultrawide spectral ranges**. This is an exclusive feature and has no commercial counterpart.

A combination of two optically contacted thin plates cut at a proper angle with respect to the optical axis forms a **true zero-order** phase retardation plate, similar in design to the Savart plate.



The required phase retardation is achieved by tilting the plates by 8° - 15°. This design is aimed at avoiding light reflection back to the laser system which in many cases results in complications.

The new phase retardation plates are indispensable in research with widely tunable or broadband laser sources like dye lasers, optical parametric generators and femtosecond lasers.

Although they have new and exclusive features and have no commercial counterpart, they are offered at very competitive prices, which are typically lower than those of the ordinary plates.

Applications:

polarization measurement and control, laser research, spectroscopy, nonlinear optics, OPO, femtosecond lasers

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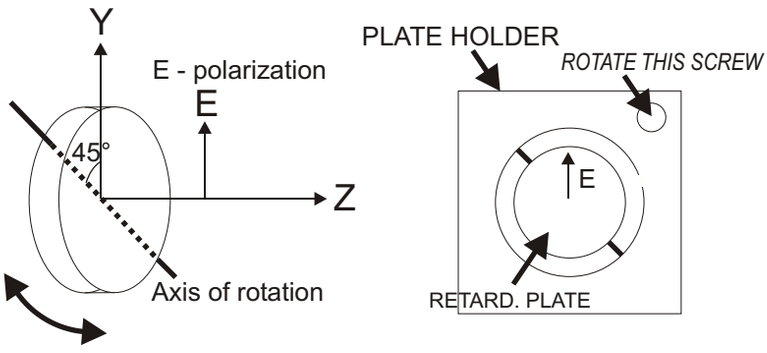
ALIGNMENT PROCEDURE USING THE SPECIAL PLATE HOLDER

1. Orient the holder in such a way that the **polarization plane** of the incident beam **is parallel to either edge** of the rectangular plate holder. In the Figure, one possible polarization orientation **E** is shown; the other one would be the polarization, rotated by 90°.

2. Rotate the screw until the retardation plate is parallel to the plane of the holder. After that align the whole device so that both plate and the holder are perpendicular to the incident beam. The light beam will be then reflected from the waveplate exactly in the backward direction.



3. Rotate the screw, until the required retardation is achieved.
The required retardation is achieved by tilting the plate by 8° - 15° (depending on the spectral region) around an axis which is in a plane at 45° with respect to the light polarization (see the Figure).

The alignment for **half-wave retardation** is achieved when the plate is positioned between two **parallel** polarizers and by tilting the plate the transmitted light is totally **extinguished.** In order to rotate the polarisation plane by an arbitrary angle, use the rotation part with degree dialing.

The alignment of a **quarter-wave plate** is correct when the transmitted light reaches the half of the maximum intensity and it remains constant for an arbitrary rotation of the second polarizer. The retarder design allows generation of both left-hand or right-hand circular polarization. The change of the polarisation state (right-hand/left-hand) is achieved by rotating the plate by 90°.

The alignment procedure is quite simple and after getting some experience the desired polarisation state can be easily adjusted. A major advantage of the novel design is that the retarders are tilted with respect to the laser beam which avoids the back reflection as well as etalon effects. This feature is especially favorable for applications in modelocked lasers.

Alternatively, we supply tuning curves with the dependance of the tilt angle on the wavelength.

Please note that when the plate is not tilted, there is not any definite optical axis as in the case of the ordinary phase retardation plates.

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