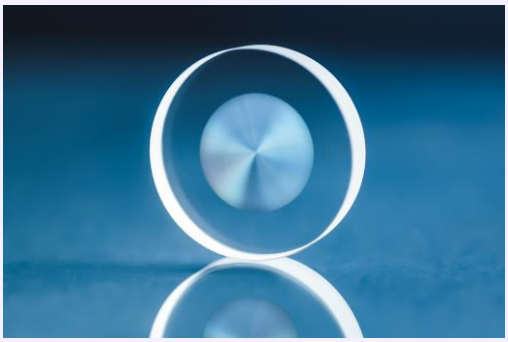
ALRAD Instruments Photonics Spotlight August 2023

Welcome to our August 2023 Photonics Spotlight. In this month's issue we focus on: Special Optics from Workshop Of Photonics, a company geared to providing a solution for your micron-scale applications.

Circular Grating / Flat Axicon

Transforms a Gaussian beam into a Bessel-Gauss beam.

Circular grating, also known as a 'Flat Axicon', is a space-variant retarder that transforms a Gaussian beam into a Bessel-Gauss beam.

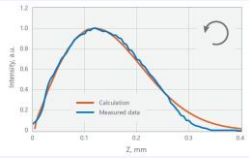


Main Features:

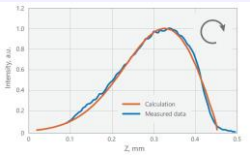
- Positive and negative Bessel-Gauss zones – 3 in 1 usage possibilities.
- Suitable for high LIDT applications and high-power lasers.
- Flat optics – saves space, easy to handle.
- Reliable and resistant surface – the structure is inside the bulk.

Circular grating | flat axicon is leading for its high damage threshold, comparing to alternative devices. It has laser irradiation resistance similar to uncoated fused silica substrates.
The structure of the element is unique due to the formation of birefringent nanograting's inside bulk fused silica glass, sensitive to the incident polarisation.

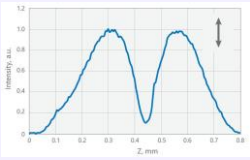
The circular grating can generate both positive and negative Bessel-Gauss zones, separately with LHCP and RHCP polarisations. Also, positive and negative zones simultaneously with linear polarisation. The working regime depends only on incident polarisation.



Positive Bessel-Gause zone



Negative Bessel-Gause zone



Positive and Negative Bessel-Gauss zone

Fast axis distribution across the element

Technical Features:

- Material: UVFS, IRFS
- Wavelength: 330 nm to 2000 nm
- Min Apex angle: 176-179.9° @1030 nm
- Diffraction efficiency: up to 95%
- Element size: up to 15 mm
- Coating (optional): AR/AR
- Uncertainty of diameter of cone tip ~20 µm
- LIDT / High damage threshold: 63 J/cm2 @1064 nm, 10 ns;
  2 J/cm2 @1030 nm, 212 fs
- Transmission (no AR coating): 85% @343 nm, 92% @515 nm, 94% @1030 nm

Application Examples:

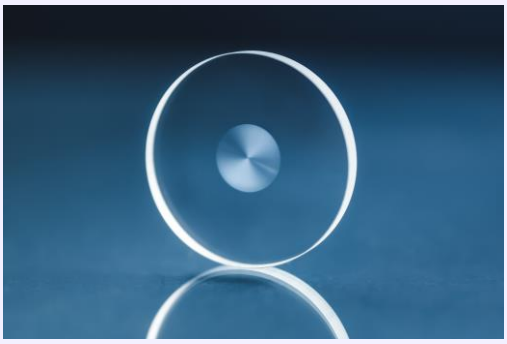
- Micromachining
- Ultra-high aspect ratio micro holes drilling
- High 90% efficiency Bragg gratings
- Cutting of transparent materials

For more information and to order, please follow the link → or call the ALRAD Sales Team on 01635 937000 , we will be happy to help:

Circular Grating

Flat Axicon

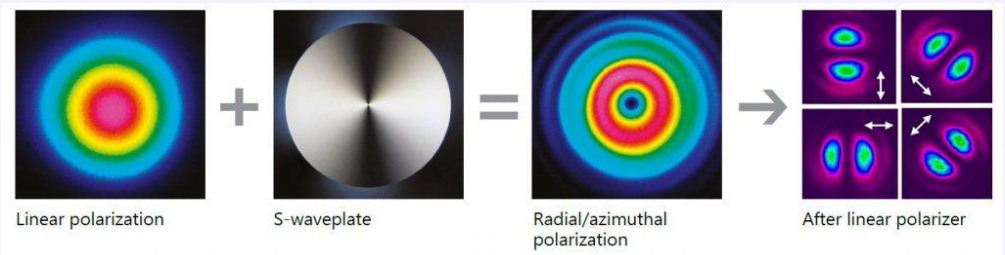
S-Waveplate Radial polarisation converter



S-waveplate converts linear polarisation to radial or azimuthal polarisation and circular polarisation to an optical vortex.

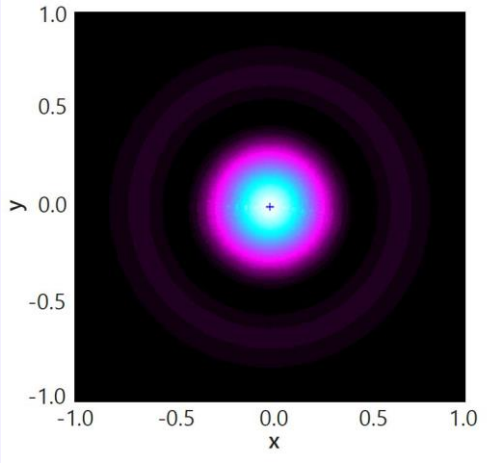
Main features:

- Converts linear polarisation to radial or azimuthal polarisation.
- Converts circular polarisation to an optical vortex.
- High 94% transmission @ 1030 nm (no AR coating).
- Stand-alone, no additional optical elements needed.
- High damage threshold: 63,4 J/cm² @1064 nm, 10 ns and 2,2 J/cm² @1030 nm, 212 fs.
- Suitable for high LIDT applications and high-power lasers.
- Reliable and resistant surface – the structure is inside the bulk.

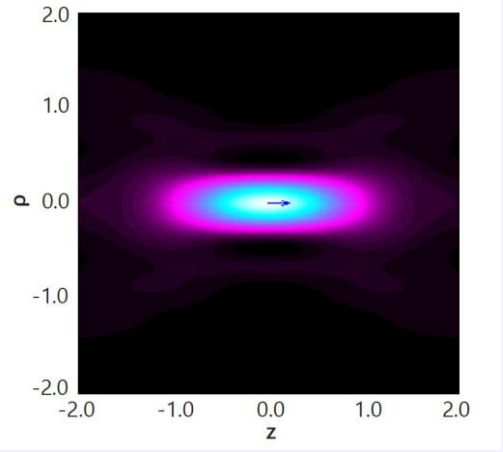


Application example:

Radial polarisation used with high NA > 0.9 (numerical aperture) allows focusing into a smaller spot size comparing with limits described by diffraction.



Normalised intensity of the longitudinal (Z) component of a high-NA (1.32) radially polarised beam at focus and through focus



Normalised intensity of the longitudinal (Z) component of a high-NA (1.32) radially polarised beam at focus and through focus

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S-Waveplate Radial polarisation converter

Special Optics

Additional specialised components, including space-variant retarders with exceptional handling in ultra-high damage threshold environments and suitable for high power lasers.

Higher Order S-Waveplate Polarisation converter

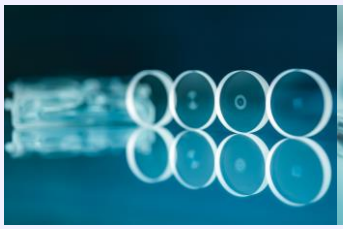
Converts linear polarisation to higher order polarisation patterns

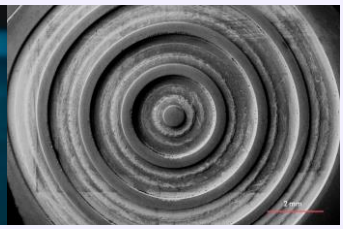
Custom Waveplates

Custom waveplates enable patterned polarisation control at the specific point of the laser beam

Flat-Top Converter / Top Hat

Acts as a space-variant transmission filter and transforms Gaussian beam to a flat-top beam





Custom Space Variant Retarders

Custom Space-variant retarders adapted to the specific end-user needs

Depolarisation Compensator

Compensates depolarisation in the gain medium

Optical Elements for THz Frequencies

Various custom diffractive optical elements, suitable for your specific THz wave manipulation applications

For more information and to order, please follow the link → or call the ALRAD Sales Team on 01635 937000 , we will be happy to help:

Special Optics

ALRAD Instruments - Technology Divisions

ALRAD IMAGING | ALRAD PHOTONICS | ALRAD ELECTRONICS

ALRAD THERMAL | ALRAD MEDICAL | ALRAD VACUUM

ALRAD Instruments has six technology divisions and a wide portfolio of components and products for industrial, scientific, research, medical and academic fields - please check out our divisions below - we will be happy to help with any questions:

ALRAD 50 YEARS 1970 - 2020

ALRAD Instruments Limited celebrated it's 50th Anniversary in 2020. Set up in 1970, ALRAD Instruments has been serving the Industrial, Scientific, Medical and Instrumentation markets for five decades and has a wealth of experience in all aspects of Imaging, Photonics, Thermal and Medical sectors.