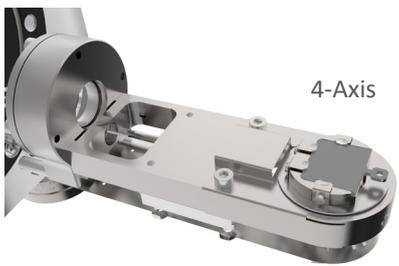
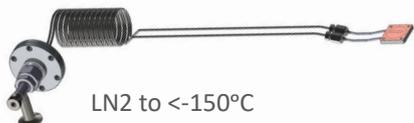


APPLICATION NOTE

MultiCentre for Surface Magneto-Optical Kerr Effect applications

The UHV Design range of MultiCentre precision manipulators provides an ideal platform for many surface science applications. The design is modular and flexible, and can be configured for 1, 2, 3, 4, or 5 axes of motion, with options for heating to 900°C or 1200°C and cooling to <-150°C or <25K using the same basic modules as shown below (see www.uhvdesign.com for more information on our standard manipulators).

 <p>4-Axis</p>  <p>5-Axis</p>	 <p>Resistive to 900°C E-beam to 1,200°C</p>	 <p>LN2 to <-150°C</p>  <p>LHe to <25K</p>
<p>4 or 5 Axis</p>	<p>Heating Options</p>	<p>Cooling Options</p>

Even so, to paraphrase a famous American president, you can't please all of the people all of the time and we are often asked to customise a device or even take-on entirely new stage concepts.

UHV Design maintains a strong focus on innovation and the ability to respond to the ever changing needs of our customer's requirements and quite recently we undertook to adapt a MultiCentre stage for one such request that came from a customer requiring a stage for a SMOKE (Surface Magneto-Optical Kerr Effect) application.

In physics the magneto-optic Kerr effect (MOKE) or the surface magneto-optic Kerr effect (SMOKE) is one of the magneto-optic effects. It describes the changes to light reflected from a magnetized surface. It is used in materials science research in devices such as the Kerr microscope, to investigate the magnetization structure of materials.

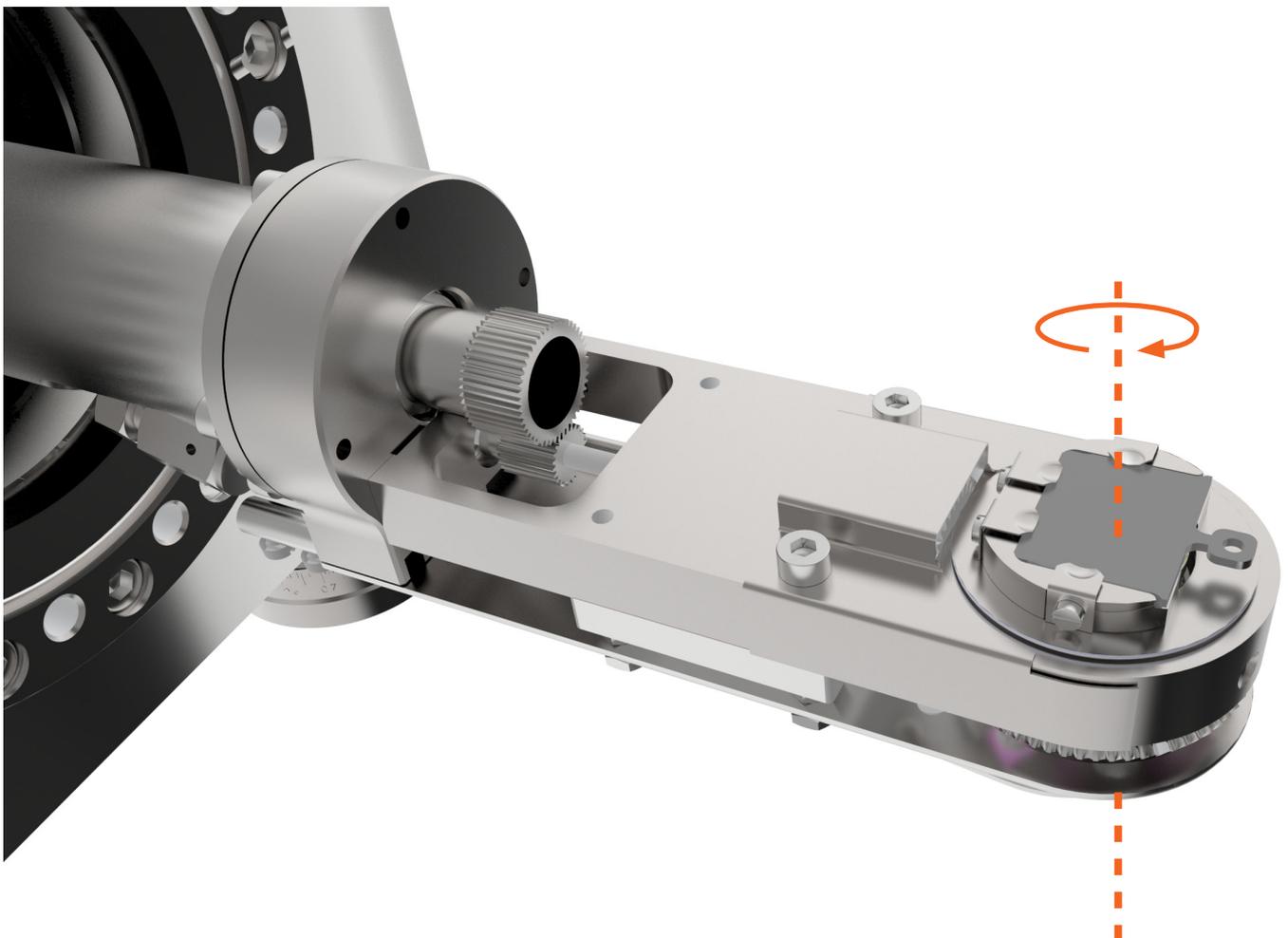
Light that is reflected from a magnetized surface can change in both polarization and reflected intensity. The effect is similar to the Faraday effect where the Faraday effect describes changes to light transmitted through a magnetic material, while the Kerr effect describes changes to light reflected from a magnetic surface. Both effects result from the off-diagonal components of the dielectric tensor ϵ .

These off-diagonal components give the magneto-optic material an anisotropic permittivity, meaning that its permittivity is different in different directions. The permittivity affects the speed of light in a material:

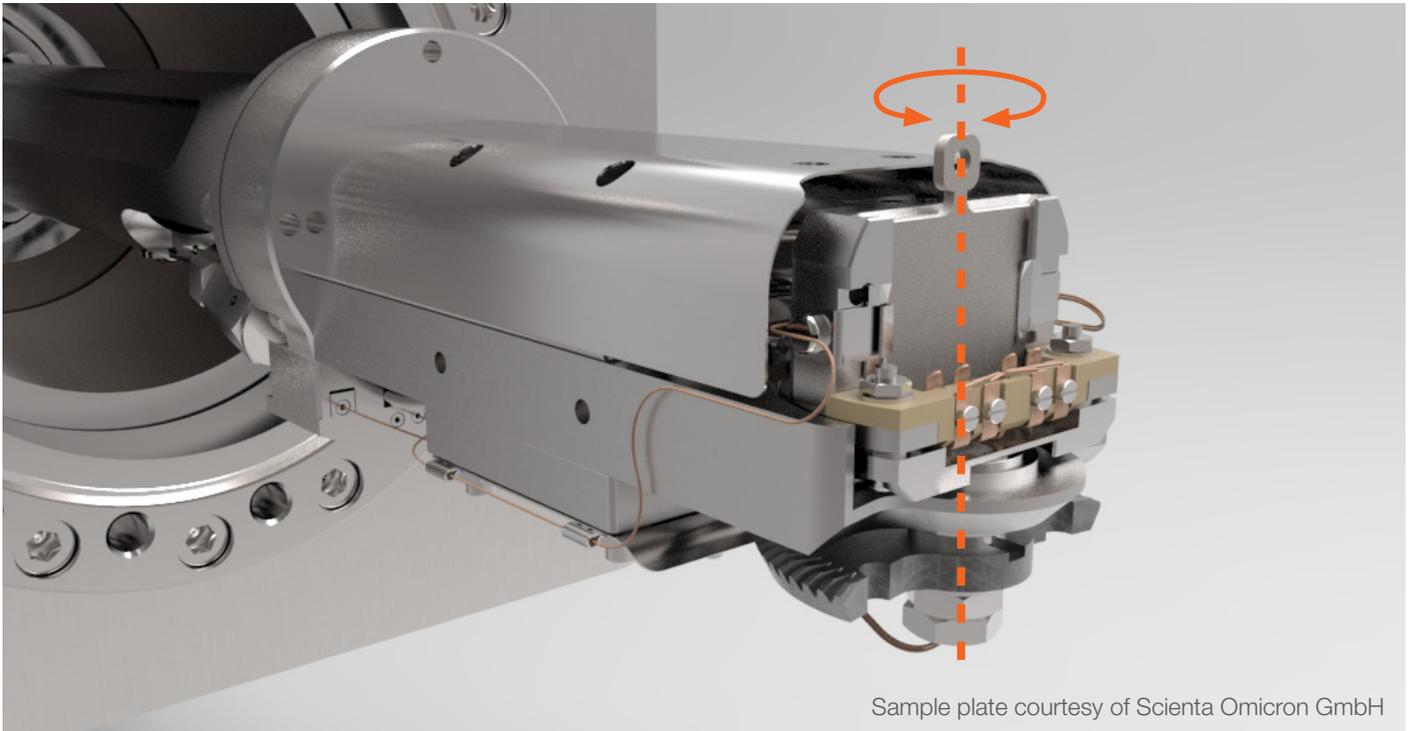
$$v_p = \frac{1}{\sqrt{\epsilon\mu}}$$

where v_p is the velocity of light through the material, ϵ is the material permittivity, and μ is the magnetic permeability; and thus the speed of light varies depending on its orientation. This causes fluctuations in the phase of polarized incident light.

In the context of our stage design this required that the sample plate be mounted parallel to the stage mounting flange, whereas it would conventionally be perpendicular and that the 5th axis which is normally the azimuthal rotation (– as illustrated below),



For the Surface Magneto-Optical Kerr Effect application this became a second tilt axis as shown below:



Furthermore the sample had to achieve a base temperature $<20\text{K}$ and the whole end of the instrument fit within the very tight confines of a superconducting solenoid. Fortunately our own proprietary design LHe cryostat has a uniquely small diameter which in turn enables entire end of the stage to be very compact and tidy.

Being designed for surface analysis instrumentation, MultiCentres as standard have the heads manufactured from non-magnetic materials which is also an important consideration for a device that has to operate in a 7T field. Likewise the temperature measurement device had to be reviewed as a conventional diode sensor cannot operate in high magnetic fields and so CERNOX sensors have been used.

FOR MORE INFORMATION

Please contact us via sales@uhvdesign.com or telephone +44(0)1323 811188 to discuss this application in more detail.

For more information on our complete range of UHV manipulation products please visit our website: www.uhvdesign.com which includes our unique product configuration tool that enables all of our products to be viewed, configured and emailed directly as a 3D CAD file.

+ [Click here to learn how to use the product configuration tool](#)



Available products: 1



TTX40-100-25-H

ORDERNO Order number	TTX40-100-25-H		
INFO Info	-		
TFS Travelling flange size	CF40		
FFS Fixed flange size	CF100		
AO Actuation options	Manual thimble		
S Axial stroke	25		
POS Position	<input type="text" value="0"/>	mm	
POSX Position	<input type="text" value="0"/>	mm	
POSY Position	<input type="text" value="0"/>	mm	
ROT Rotation	<input type="text" value="0"/>	°	
E Encoder	NO		
W Weight	11.8	kg	



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3D

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