



## **Case Study**

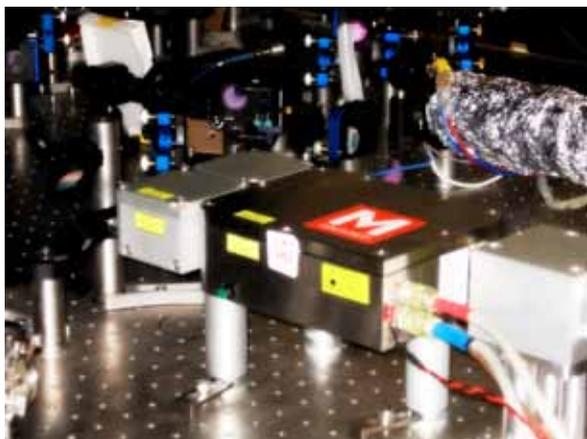
**Narrow Linewidth CW Alignment-Free  
Ti:S Laser is a Reliable Work-Horse  
for Optical Squeezing at Birmingham  
University**

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# Transverse Optical Squeezing

Dr. Vincent Boyer has had a SolsTiS Ti:S laser for over two years now.

Throughout that time the laser has been incorporated at the centre of his Quantum Optics Research Group's apparatus for transverse optical squeezing.

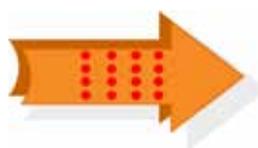
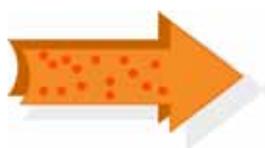


The Group has succeeded in creating a multi-spatial-mode squeezed light field, reducing the quantum noise on measurements to a level below the standard quantum limit (shot noise).

The Group's method involves regularising the transverse distribution of the photons in the beam profile to squeeze out the quantum fluctuations in the transverse intensity profile, enabling it to be used as an accurate precision instrument or quantum probe.

A Rubidium vapour cell is used to generate a four-wave-mixing process creating photon pairs. These photons are subsequently recombined in the apparatus to create the squeezed beam.

Controlling the intensity with greater accuracy at any given point in the beam profile enables a variety of potential applications including more accurate laser beam deflection measurements in atomic force microscopes. The squeezed beam can also be used as an illumination source in microscopy to improve the quantum limit of optical resolution.



The squeezing process organises the photons transversely and in the time dimension.

## Why the SolsTiS was chosen

The Birmingham University Quantum Optics Group selected a SolsTiS because of its low amplitude noise, low mechanical noise, thermal stability and the low maintenance, alignment free nature of the design and technology. Tuned to the Rubidium D1 line, the laser is simply switched on from cold each morning and is ready to start immediately.

In particular, Dr. Boyer cites the robust build quality of the SolsTiS as an important factor in eliminating mechanical (technical) noise from the experiment's delicate and complex apparatus.

The SolsTiS is the world's only alignment-free ultra-compact CW Ti:S laser. Tuning range and power settings are all adjusted remotely via Ethernet: ideal for a device installed which is installed at the centre of a large experiment.

<read more...>



## SolsTiS cw Ti:S Laser

On the basis of its extreme reliability, usability and Ethernet Control, the SolsTiS is the tool of choice for researchers pushing at the frontiers of quantum optics.