

## 2D-LDV Long Range Optics



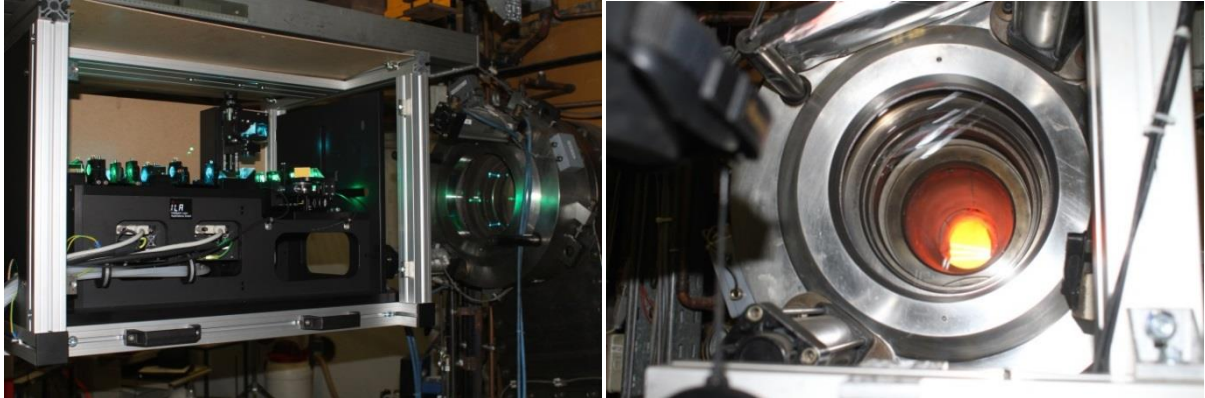
### Overview

Some non-standard LDV applications such as measurements in big wind tunnels or big pipes need a longer-than-usual focal length to access the measurement area. Typically these applications require focal lengths in the region of 1000 mm and beyond. Using a standard LDV system, even when fitted with a beam expander, will lead to unacceptably elongated measurements volumes, 5-10 mm or more, with the resultant effect of poor spatial resolution and poor signal quality due to reduced laser intensity. ILA R&D GmbH has developed a Long Range LDV Optics for these applications, with achievable focal lengths of 2m and above.

The idea of the optical setup is to maximize the beam distance, in practice up to 400mm. Of course such beam distances cannot be practically achieved with a single front lens. Instead each beam has its own collimation optics to focus the beam inside the measurement volume. The receiving optics is positioned in the middle of the beams and operates in backwards scattering mode. The received light is split into its different constituent wavelengths and coupled into multi-mode fibers linking into the photodetectors of an ILA LDV-Controller or, in the case above, into a BSA.

Both components are shifted with an integrated Bragg cell. The laser sources are two DPSS- Genesis 2W Lasers with 514nm and 488nm. They are coupled directly into the LDV-Optics without using single mode fibers. So the system is able to bring nearly 1,4 W of Laser power for each wavelength inside the measuring volume, which would be impossible to achieve with mono-mode fibers.

The adjustment of the complex optics is surprisingly easy and fast, as Diego Zabrodiec (RWTH Aachen, WSA) can testify: "For my old optical setup I needed hours to adjust the sending fibers and the beams to reach an adequate laser power and beam overlap inside the measurement volume. The new ILA optics saved me a lot of time for adjustments, time that I could invest into flow measurements inside a combustion chamber."



Size of the Measurement Volume				
wave length	focal length	beam distance	MV-width	MV-length
514 nm	1750mm	220 mm	102 $\mu$ m	1,6 mm
488 nm	1750mm	280 mm	97 $\mu$ m	1,2 mm

## Specifications

Type of Optics	2D, shifted
Laser Source	Direct coupled integrated laser heads: Genesis 2 W, 514 nm, 488 nm
Focal Length	Variable from 0.6 m min. to 2.5 m max. (longer length may be possible)
Beam Distance	Variable from 220 mm to 350 mm
Beam Diameter	12 mm, changeable with lenses inside the collimator