

A FAST DIGITALLY CONTROLLED XY-SCAN-HEAD WITH STATIONARY OBJECTIVE APERTURE ILLUMINATION

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KEY WORDS: digital galvo controller, stationary objective aperture illumination

Important demands on xy-scanners for laser scanning microscopes or optical tweezers are speed, accuracy and intersecting scan axes. We engineered a scan-head with a novel electronic and optic design.

Due to a suitable transfer optics both scan mirrors are imaged onto each other. This leads to a stationary beam on both scan mirrors. The two orthogonal scan axes are no longer separated but intersect each other. Thus we achieve a constant illumination of the objective back aperture. Especially in two photon microscopy a non constant illumination of the objective aperture causes a drastic drop in brightness at larger scan angles.

A new digital controller board based on a digital signal processor fits the control signal to the physical model of the galvo and applies the optimal driving voltage to achieve fast and precise movements. The remaining limitations originate from the physical limits of the galvo due to heat dissipation.