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Measurements of laboratory turbulence with the 2d-Laser Cantilever Anemometer JAROSLAW PUCZYLOWSKI, JOACHIM PEINKE, MICHAEL HOELLING, University of Oldenburg — A newly developed anemometer, the 2d-Laser Cantilever Anemometer, was used to measure the two-dimensional wind speed vector in laboratory-generated turbulence. The anemometer provides a temporal and spatial resolution comparable or even higher to those of commercial hot-wires and thus is an excellent alternative for high-resolution measurements. The 2d-Laser Cantilever Anemometer uses a previously unseen measurement technique in the range of anemometers. The principle is adopted from atomic force microscopes (AFM). A tiny micro-structured cantilever is brought into the airflow, where it experiences a drag force due to the moving fluid. The resulting deflection is measured using the laser pointer principle. Unlike the measuring principle of hot-wires this technique can be applied in challenging environments such as in liquids or very close to walls. Our comparing measurements with the 2d-Laser Cantilever Anemometer and an x-wire were carried out in the wake of rigid bodies and grids. The results show a great agreement with regards to the increment statistics on various scales, power spectra and turbulence intensity, thus proving the new anemometer.

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