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Femtosecond laser micromachining

Femtosecond lasers can be used as extremely sharp, high-precision knives by focusing on a target material (e.g. gold, stainless steel, silicon or paper) that is quickly ablated. In this project, the students will use the micromachining capabilities of KTH LaserLab (PHAROS femtosecond laser; 5-axis CNC positioner) to develop high-precision micromachining in hard materials. The students will learn to design their own micromachining projects in CAD (Autodesk Inventor), convert it to G-code and align the micromachining setup with the femtosecond laser to cut high-precision structures. Furthermore, they will commission new precision mechanics for nanofabrication, resulting in unprecedented resolution in target structures.



Fig. 1. Photograph of the femtosecond laser (PHAROS, 200 fs, 10 W, up to 1 mJ, up to 1 MHz, Light Conversion) and a schematic of a 5-axis CNC positioner that are combined to make a micromachining setup with a resolution of approximately 10 μ m.