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Satellite Laser Ranging with a fibre-based transmitter

The experimental satellite laser ranging station in Stuttgart has commenced operations in January 2016. Its modular, flexible and cost-efficient design uses only readily available components and is therefore well suited for an upgrade of existing astronomical observatories to SLR stations. One of its key features is the laser light transmission via an optical fibre, thus avoiding the need for a coudé path mount. Currently, the transmitter achieves an output pulse energy of about 25 µJ at 3 kHz (75 mW) and is operated at the fundamental Nd:YAG wavelength of 1064 nm. The complete system, including IT hardware and observer workplaces, is fitted into a 12 feet dome. With the current configuration, many cooperative targets in LEO and beyond (up to LAGEOS) have successfully been observed, with usual return rates of several hundred counts per second. Since the tracking relies on visual guiding, no accurate CPF predictions are needed, and out-of-service SLR targets like GEOS 3 can be observed as well using public TLE data. In the future, the system is envisaged to operate at much higher repetition rates (>100 kHz) to further increase the performance. In the long-term, the goal is to approach current ILRS standards in terms of precision, maximum range and availability (daylight ranging) with this design. This contribution describes the technology, first results and planned upgrades.