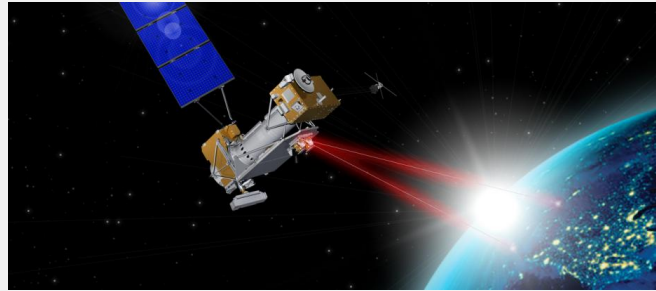




Introduction

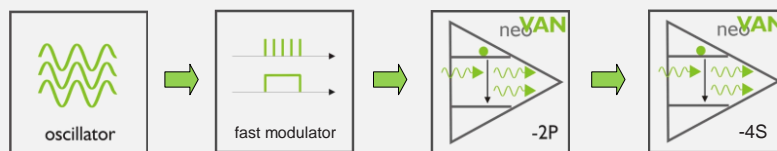
This white paper introduces a customized, high power, single-frequency neoMOS laser system with more than 90 W output power for satellite communication applications.



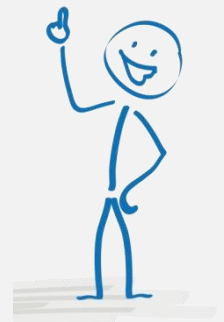
Picture credit: NASA

neoMOS: *high power single-frequency*

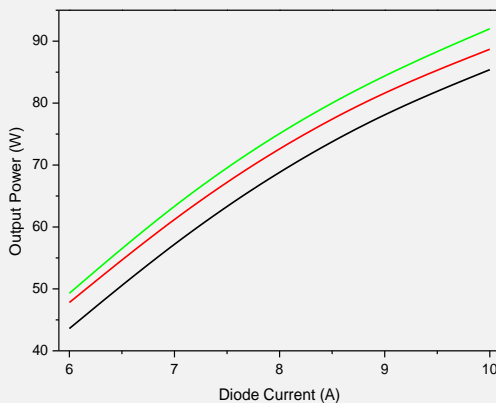
The MOPA laser is based on a single-frequency oscillator, a fast modulator and two neoVAN amplifier modules. The system enables a clean, high frequency amplitude modulation at a specific frequency adapted to the input receiver.



A motorized half wave plate in combination with a polarizer downstream of the system enables flexible power variations while keeping other laser parameters constant.



Parameter

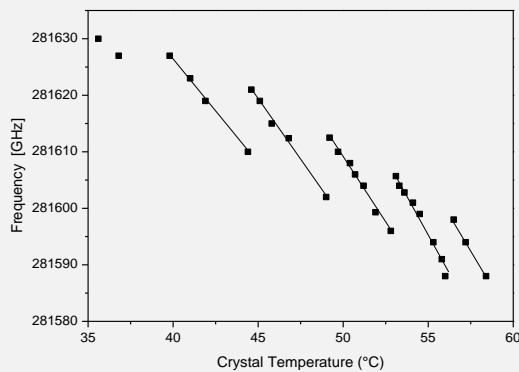


The output power of the system was measured to be > 90W at a 1 MHz sine shaped light modulation signal. The graph on the left shows the output power of the system for 3 different pre-amplifier configurations. The modulation depth was better than 95% and the long term power stability was determined with < 0.2% RMS over a period of 8 hours.



The beam quality factor M^2 was below 1.3 in all power regimes and the beam roundness was better than 95%. The pointing of the laser output was measured over a period of one hour and shows less than $< 10 \mu\text{rad}$ deviation.

Stable and high-power single-frequency laser systems are essential for fundamental research like gravitational wave detection, non-linear and quantum optics, atom cooling and trapping or spectroscopy. These applications require a changeable laser frequency enabled by the seed laser tuning.



For the communication purpose the laser frequency must be adapted to the receiver to guarantee an optimized signal and therefore high bandwidth communication. A high-power narrow-linewidth optical signal guarantees optimal (coherent) reception condition on the satellite. The graph on the left shows a tuneability of $\pm 15 \text{ GHz}$ of the laser (carrier) frequency of 281.594 GHz.

This allows for fine-tuning of the central frequency on Ground to compensate for residual transmission irregularities.

Design

The compact systems footprint measures only $830 \times 450 \text{ mm}^2$ plus an additional 4HU rack for the laser electronics. The system is equipped with the neoCON standard software to set all relevant laser parameters and monitor system control signals and temperatures. The seed oscillator is fully integrated and also controlled by neoCON software.

neoMOS

The neoMOS laser platform offers a wide range of laser parameters starting from cw-single frequency, high energy pulses up to short pulse femtosecond radiation. The unique platform and the neoLASE long term experience enable a high quality production of customized laser systems on industrial standards and high reliability. True to our motto "brilliance in customized laser solutions", we look forward to your inquiry on www.neolase.com or info@neolase.com.