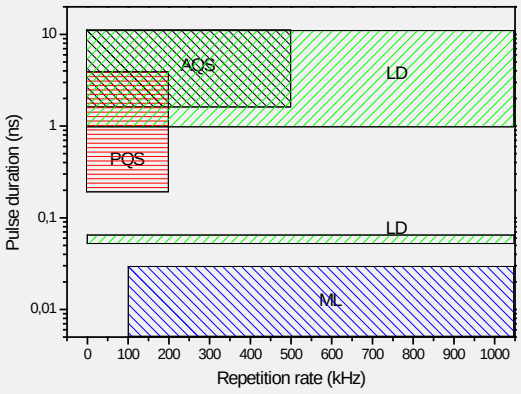
Introduction

This white paper will give an overview of different seed laser technologies to be integrated in the neoMOS laser platform.

neoMOS: flexible laser platform

The neoMOS laser systems are based on a MOPA (**M**aster **O**scillator **P**ower **A**mplifier) architecture that combines the neoLASE amplifier modules with different oscillators also called seed lasers. This technology enables neoLASE to address a variety of different laser parameters and pulse durations from the same laser platform. For the pulse duration range of a few nanoseconds down to about 100 fs, different seed laser technologies are available. Depending on the required pulse duration, active (AQS) and passive q-switched (PQS) oscillators, modulated laser diodes (LD) or pulse picked mode-locked oscillators (ML) are available on the market. The graphic shows an overview of the typical operation regimes for theses lasers[1].



For the shown parameter range, laser diodes will enable the highest flexibility and in terms of timing jitter the best performance. They are therefore an ideal candidate for measurement applications with high timing accuracy. Gain switched diodes can achieve short laser pulses down to about 50 ps. On the other hand the pulse energy from a diode is weak (typically < 1 nJ) and therefore a higher amplification factor is needed to get into the range of several hundred µJ pulse energy. Higher energy levels (> 1 µJ) can be extracted from q-switched lasers. In terms of pulse duration, PQS oscillators can deliver pulse durations down to 200 ps, while the repetition rate is limited to about 200 kHz. Slightly longer pulses and higher repetition rates can be extracted from AQS oscillators. The timing jitter of q-switched lasers typically is higher than for a laser diode, about 500 ns and > 1 µs for AQS and PQS seed sources, respectively. Triggering or active pulse control is not possible for the latter at high repetition rates. Shorter pulse durations can be achieved by mode-locked fiber oscillators and can address the range of < 50 ps down to < 100 fs. Theses oscillators operating at a high repetition rates (> 20 MHz) and needed to be externally pulse picked to get down to lower frequencies.

In terms of beam quality all systems have a nice Gaussian beam with good beam quality. The table blow shows a summary of the compared systems and demonstrates that all systems have their pros and cons. NeoLASE will help you to pick the seed source, which fits best to your application.

	Shortest pulse duration	Highest repetition rate	Highest pulse energy	Lowest timing jitter	Lowest Price
AQS	-	o	+	o	-
PQS	o	-	o	-	+
LD	+	+	-	+	o
ML	++	+	-	+	-

In addition to these traditional seed lasers, neoLASE uses continuous wave laser modulation to achieve variable pulse durations and repetition rates. This can be a solution to generate low noise pulsed single-frequency systems for example.

The neoMOS laser series offers a wide range of laser parameters due to integration and amplification of the presented seed laser technologies. Energy levels > 40 mJ or > 200 W average power have been demonstrated. The compact neoMOS footprint typically measures about (650 x 450) mm plus an additional 4-6HU rack for the laser electronics. The seed laser can be separated from the laser head or being directly integrated. The system is equipped with the neoCON standard software to set all relevant laser parameters and monitor system control signals and temperatures. The seed lasers are fully integrated and also controlled by neoCON software.

True to our motto "brilliance in customized laser solutions", we look forward to your inquiry on www.neolase.com or info@neolase.com.

1: Active q-switching can do longer pulse durations and higher energies, diodes and mode-locked systems can do higher repetition rates. To give a more general overview the parameter range was limited to common parameters even when the neoMOS platform supports a wider parameter range.