

Laser Amplification and Coherent Beam Combination for Gravitational Wave Detectors

The sensitivity of gravitational wave detectors scales with the laser power. To reduce shot noise it is necessary to have a high power, scalable and stable laser system.

Here we present two options for such systems. Both are based on solid state high power amplifiers seeded with NPRO lasers at a wavelength of 1064nm.

In the first system the laser power from two amplifiers is coherently combined on a beam splitter with variable reflectivity. The second system comprises three amplifiers in sequence.

Compared to earlier used laser systems these techniques achieve a better noise behavior and a higher reliability with similar output power. We present the results of the characterization of both concepts.