

Suppression of reflected power in the DiPOLE cryogenically cooled amplifier head

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The DiPOLE prototype laser has been developed within CALTA at the CLF as a next generation, high energy, high average power, cryogenically cooled, diode pumped solid state laser (DPSSL). The amplifier head at the heart of DiPOLE houses a number of optics including multiple gain media disks, sapphire pressure windows and fused silica vacuum windows. In this report we detail a successful investigation and rectification of a phenomenon that resulted in a gradual decrease in the output energy of the amplifier during operation. The phenomenon was traced to an increase in the reflectivity of anti-reflection coated optics within the amplifier head, likely due to a condensation layer forming under cooling.

A cross-section of the CW beam which is propagated through and reflected by the DiPOLE amplifier head.

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