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Aculight Corporation Combines 1,400 Diode Lasers into Single, High-Quality, High-Power Source

Bothell, Wash., August 31, 2004 – Aculight Corporation, a leading developer of innovative laser technologies, has produced an external cavity diode laser that combines the outputs from seven diode laser bars, each containing 200 single-mode emitters, to generate 26 watts of near-diffraction-limited light at 820 nm. To date, this may be the largest number of diode lasers combined into a single, high-beam-quality light source.

“One of the most common lasers around is the diode laser,” said Dennis Lowenthal, Aculight’s vice-president for research and development. “They’re rugged, efficient and a great workhorse for generating optical power. But poor beam quality has limited their use in many applications. A technique called spectral beam combining, however, allowed us to merge the output of several diode laser bars and yet retain the beam quality of a single emitter—the result is a novel high-power, high-quality diode source.”

Spectral Beam Combining (SBC) is a power-scalable technique that overlays the outputs of many laser emitters into a single, near-diffraction-limited beam. Aculight originally developed the 820-nm laser for a military customer that needed to project a small spot of light on a faraway target using a highly efficient light source. However, the SBC technology behind the unique laser could provide an important stepping-stone for the use of diode lasers in many applications that demand high-power, high-beam-quality light. These include laser projection displays, photodynamic therapy and as a pump source for fiber lasers.

“Until now if I wanted to use diode bars to put light into a small optical fiber, or I wanted to shine the light a hundred miles away and still have a small beam, I couldn’t really do that,” said Lowenthal. “It’s keeping them from being used as illuminators, or as pump sources for fiber lasers. Using SBC technology, we’ve added a few optical components to some diode bars and improved the optical quality by a factor of a thousand. All of a sudden we’ve created a rugged, efficient, high-quality light source that can be reproduced in any wavelength that diode lasers are available.”

Aculight is now working to bring SBC technology to market. The goal is to eventually enable production of high-power laser sources with excellent beam quality at a lower cost per watt than is currently available. Moreover, SBC technology can be applied to technologies other than diode lasers, such as the latest fiber lasers. "SBC can be used to combine many types of lasers, so could really be an important tool to bring the latest technologies into applications such as materials processing that demand rugged, efficient, very high-power sources still capable of generating small spot sizes," said Lowenthal.

Aculight presented their novel laser in a paper at the 17th Annual Solid State and Diode Laser Technology Review (SSDLTR) conference this June in Albuquerque, New Mexico. The paper was entitled "High Power Laser Source with Spectrally Beam Combined Diode Laser Bars." The company also presented papers that included "60-Watt Output at 540-nm from a Frequency Doubled LMA Fiber Laser System," "Spectral Beam Combining of Large Mode Area Fiber Lasers," and "Fiber Laser Pumping of CW and Pulsed Optical Parametric Oscillators."

Founded in 1993, Aculight Corporation develops and manufactures innovative laser technologies for medical, industrial and national defense applications. Aculight's technology portfolio includes fiber lasers, diode-pumped solid-state lasers, nonlinear optics, and external cavity diode lasers. For more information about Aculight, please contact Andrew Brown, director of business development, at (425) 482-1100, or visit www.aculight.com.

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