Random Lasers Fight Noise, Improve Imaging

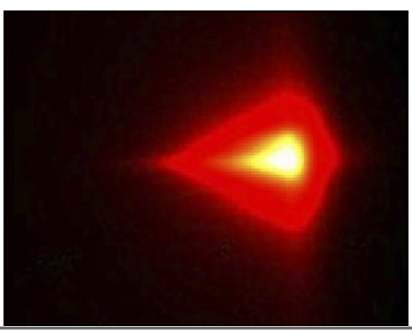
NEW HAVEN, Conn., May 1, 2012 — A new random laser illumination source for medical imaging equipment could improve the clarity and processing time of images, advancing the fields of microscopy and endoscopy.

Current imaging systems rely on a variety of light sources — LEDs, specialty lightbulbs and traditional lasers. Traditional lasers, the brightest of these light sources, yield undesirable visual byproducts such as speckle, which looks like a snowfall pattern.

To generate speckle-free images, Yale University scientists engineered a random la[Discuss]ates and emits light in a manner different from traditional lasers. It serves the same function, but without giving off visual byproducts that mar the final image.

"Our work is innovative and significant because we show that random lasers are much brighter than LEDs and lightbulbs and also generate speckle-free images," said Michael A. Choma, an assistant professor of diagnostic radiology, pediatrics and biomedical engineering at Yale.

Traditional lasers emit a single intense beam of light, known as a spatial mode. Pho[Related]t beam can be scattered by a sample under observation, resulting in grainy background noise, or speckle, on top of the desired image.



Light emerges from a random laser[More]ndon Redding, Yale)

Using different spatial modes, such as the light emitted by an LED or a lightbulb, would mitigate the noise. Unfortunately, such light sources are dim compared with lasers.

The Yale random lasers offer the best of both worlds because they are bright, like lasers, but also can operate in many modes, like lightbulbs, so they generate speckle-free ...ing akin to a lightbulb w...ty of a laser.

"Our random lasers combine the advantages of lasers and the white light sources, and may be used for a wide range of imaging and projection applications," said Hui Cao, a professor of applied physics and physics at Yale.

The light emitted by such lasers could enable faster image generation, helping researchers and clinicians to better capture broad swaths of tissue in less time than current methods and fast-moving physiological phenomena, such as the movement of embryo hearts or blood-flow patterns in the eye.

"Your light source really defines the boundaries of what you can do — how fast you can image," Choma said. "And you always want to go faster."

The lasers also could have applications in consumer electronics; for example, in digital light projection systems.

The team has produced a prototype random laser for use in imaging applications and is working to refine it.

The results were reported online April 29 in *Nature Photonics*.

For more information, visit: www.yale.edu

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If I were to use a White Light Random Laser - would it be the same as a white LED which we currently use for our imaging scanner?
White LEDs are generally a combination of RGB LEDS to produce the white light.
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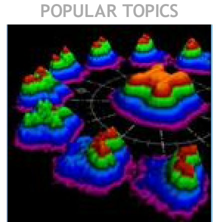

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