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New laser is from the birds

[Light amplification device inspired by brightly colored feathers](#)

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ENLARGE

CHEEP LASER

The physical principle that gives this cotinga bird its bright blue hue has inspired a new kind of laser.

Ltshears

The brilliant plumage of bluebirds, blue jays and parrots has inspired a new kind of laser. The device mimics structures in these birds' feathers that can create color without pigments.

The barbs of these feathers contain tiny pockets of air. Light striking the tightly packed air bubbles scatters, bringing out deep shades of blues and ultraviolet (which birds can see but humans can't).

"Birds use these structures to create colors that they can't make in other ways," says Richard Prum, an ornithologist at Yale University who discovered the mechanism behind this color.

To make a two-dimensional imitation of a bird feather, Yale physicist Hui Cao and her colleagues punched holes into a thin slice of gallium arsenide semiconductor. The holes were arranged like people in a crowd — somewhat haphazardly but with small-scale patterns that dictate roughly how far each hole is from its neighbor.

"The lesson we learned from nature is that we don't need something perfect to get control," says Cao, whose team describes their laser in the May 6 *Physical Review Letters*.

Near-infrared light pumped into the material bounces around between the holes, just as it would between two mirrors inside a traditional laser. Small clusters of another semiconductor, called quantum dots, amplify the light and start the lasing process.

The near-infrared beam that emerges isn't perfect. But it's more efficient than nanostructured lasers that are based on totally random materials, says Cao. And the featherlike material is much easier to make than the perfectly ordered photonic crystals that produce cleaner laser beams.

"They're trying to strike the balance between ease of fabrication and predictability," says Diederik Wiersma, a physicist at the European Laboratory for Non-linear Spectroscopy in Florence, Italy.

By tweaking the spacing of the holes and expanding the design into three dimensions, the team hopes to make a new kind of cheap, practical laser that isn't just for the birds.

SUGGESTED READING :

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