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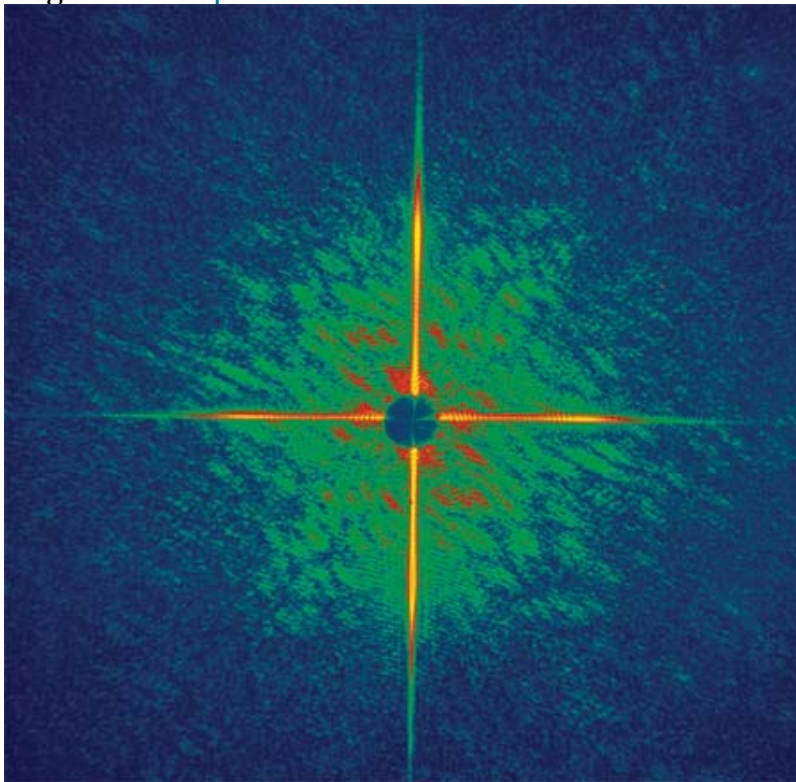
Navy Takes Next Step Towards Laser 'Holy Grail'

· By [Nathan Hodge](#)

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U.S. Navy ships could one day knock down incoming missiles with energy weapons that never run out of shots, and tune themselves to slice through the ocean air.

On Monday, the Office of Naval Research [awarded contracts to both Raytheon and Boeing](#) worth an initial \$6.9 million each for preliminary design work on a new free electron laser, or FEL. This model would be about seven times stronger than any similar laser — reaching up to 100 kilowatts, or weapons-grade. Eventually, that could pave the way for a directed-energy weapon that can replace the Navy's current system for close-in ship defense, the [radar-guided Phalanx gun](#).

The Phalanx system — which also [protects against rocket and mortar attacks on land](#) — is limited by the range and magazine capacity of its 20mm autocannon. In theory, a laser-based system would offer greater range, and a potentially unlimited number of shots. Plus, it might

be fast enough to defend against "[new, challenging threats, such as hyper-velocity cruise missiles](#)," as Boeing puts it. Directed energy is also an appealing option for countering rocket and mortar fire, because it could theoretically be used to [defend populated areas](#).

Blasts from other energy weapons have a tendency to get absorbed by the moist, salty atmosphere around the sea. When that happens, those lasers are out of luck, because they only fire at one particular wavelength. But the free electron laser (FEL) can fire at lots of different points along the spectrum. ([Click here to learn why](#).) So sailors can pick which frequency will cut through the ocean air best — and blast away. It's one of several reasons why the FEL has been called the "[Holy Grail of lasers](#)."

But FELs have been promised for [decades and decades](#). (During the Star Wars era, the government sank [ten years and a half a billion into a FEL](#). All it could only muster a meager 11 watts.) To make the energy weapons finally come true this time, the Navy and its contractors will have to do more than just build a better laser. The whole thing will depend on the development of [all-electric ships](#) that would have enough onboard juice to power these futuristic weapons.

– **Nathan Hodge and Noah Shachtman**

[PHOTO: Lawrence Livermore National Laboratory]

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