

## News & Comments

# Scientists Developed an Eternal Laser that Stays on Forever

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Technically can make 'atom lasers' that comprise continuous waves of matter according to quantum theory, which also allows us to define things like atoms as waves. To use these matter waves in practice, it is difficult to get them to survive long enough.

Interesting Engineering reports that a team of Amsterdam scientists has demonstrated that this can be achieved through tweaking the principle that underpins the atom laser, the Bose-Einstein Condensate, or BEC.

In a BEC, bosons are cooled to just a fraction above absolute zero. They move close enough to each other that their quantum properties no longer interfere with each other at these low energies, creating a high-density cloud of atoms that behaves like one 'super atom' or matter-wave.

BECs are something of a paradox. They are so fragile that even light can destroy them. A traditional atomic laser is pulsed and involves firing off a single pulse. But to create a continuous BEC, scientists decided to spread the cooling steps, not over time, but in space by making the atoms move while they progress through consecutive cooling steps, which resulted in the arrival of ultracold atoms heart of the experiment that can be used to form coherent matter waves in a BEC. The best part is while these atoms are being used; new atoms are already on their way to replenish the BEC, according to the study. And that is how the process goes on forever.

The author reported that an optical laser with fully reflective cavity mirrors is our matter-wave analogue

"This proof-of-principle demonstration provides a new, hitherto missing piece of atom optics, enabling the construction of continuous coherent-matter-wave devices." The team wrote in their paper.

### KEYWORDS

Matter waves and particle beams, Quantum metrology, Ultracold gases, Bose-Einstein condensate, Quantum Mechanics, dark matter, dark energy, Atom, atom laser space

