

Physicists to Develop World's Smallest Light-Powered Gyroscope

At the City University of New York, a team of applied physicists has devised a method to develop world's smallest light-powered gyroscope — a fraction of the width of a human hair — that will enable a new generation of phenomenally compact gyroscope-based navigation systems, among other intriguing applications.



A gyroscope is a device for measuring or maintaining orientation, based on the principle of preserving angular momentum. More than creative learning toys, gyroscopes are indispensable components in a number of technologies, including inertial guidance systems, which monitor an object's motion and orientation.

"We have found a new detection scheme that may lead to the world's smallest gyroscope sooner," said Li Ge, physicist at the City University of New York. Space probes, satellites and rockets continuously rely on these systems for accurate flight control.

Optical gyroscopes have no moving parts. Instead, dual light waves race around an optical cavity or fibre, constantly passing each other as they travel in opposite directions. After directly measuring the colour change of the light waves, the researchers determined that they could measure the pattern the light produced as it exited the cavity.

"That was our key innovation — finding a new signal with a much improved sensitivity to rotation," said Ge in a paper that published in The Optical Society's (OSA) new journal *Optica*.

A pair of light waves — one zipping clockwise the other counterclockwise around a microscopic track —

holds the key. According to researchers, further studies are needed to take into consideration the possibility that many modes, or light paths, exist simultaneously in the cavity.