

Breakthrough with light could help viral research

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(PhysOrg.com) -- Researchers have developed a method using the force of light to gently trap, manipulate and study tiny, active objects as miniscule as viruses -- opening doors to expanded viral research.

A Canada-Spain research collaboration between University of Victoria engineering professor Dr. Reuven Gordon and Institute of Photonic Sciences (ICFO) group leader Dr. Romain Quidant has developed a new method to gently trap, manipulate and study tiny, active objects as miniscule as viruses without inflicting any damage.

The research was reported this month in the online version of [Nature Physics](#).

Using a new approach to the established technology called “optical trapping,” the team demonstrated that it is possible to use the force of light to hold and manipulate 50 nanometre particles—two thousand times smaller than the width of a human hair—something previously considered impossible.

Since most viruses range from 10 to 300 nanometres in size, scientists hope that this new method of optical trapping will significantly expand viral research.

“The usual approach to optical trapping does not work well at the nanometre scale,” says Gordon, who spent several months at the Barcelona-based ICFO working on this project. “If the particle is made

twice as small, a 30 times more powerful laser is required to hold it, meaning that damaging powers are needed for small particles—especially if they are biological particles such as viruses. We have discovered a much gentler way to hold virus-sized particles with a 100 times less power.”

The team, including UVic PhD students Yuanjie Pang and Fatima Eftekhari, conducted their research by directing the light source through a small hole in a [metal film](#) that is only a few times as large as the tiny particles they were studying. When the particle gets close to the hole, it changes the flow of the light dramatically. This reaction has a favourable effect on trapping since it amplifies the light force but requires less [light](#) power.

“This means, for the first time, it may be possible to trap and study viruses, which is something we have started experimenting with,” says Gordon. “One interesting possibility would be to trap a [virus](#) and then bring it close to a living cell to see how they interact. Hopefully this will help us better understand the virus-cell interaction and help stop infection.”

More information: www.nature.com/nphys/journal/v.../full/nphys1422.html

Provided by University of Victoria

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