Wallflowers become extroverts in a crowd

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While it's long been said that two's company and three's a crowd, that's just how mesons like it. A recent experiment at DOE's Jefferson Lab demonstrates that these subatomic particles engage more with other particles when in a crowd.

One of the simplest ways to study subatomic particles is to scatter a highly energetic beam of particles off a single proton. However, the reality is a little messier. Most nuclear physics experiments produce new particles inside nuclei, which contain many protons and neutrons. A nucleus presents far more crowded conditions: new particles are surrounded by the nucleus' protons and neutrons, and their quarks and gluons.

Physicists conducted an experiment to measure how easy or difficult it is for a particle to travel through the crowded conditions of different nuclei, their so-called nuclear transparency. In the experiment, energetic photons were beamed into the nuclei of five targets: deuterium, carbon, titanium, iron and lead. Two types of mesons, omega and phi, were produced as the photons smacked into the nucleus. Just like protons and neutrons, omega and phi mesons are built of quarks.

The experimenters found that the more protons and neutrons in the nucleus, the fewer omega and phi mesons made it out. Hence, in terms of nuclear transparency, the nucleus becomes less transparent to mesons as its numbers of protons and neutrons increase.

The new paper featuring the result was published in the September 10

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Provided by Jefferson Lab