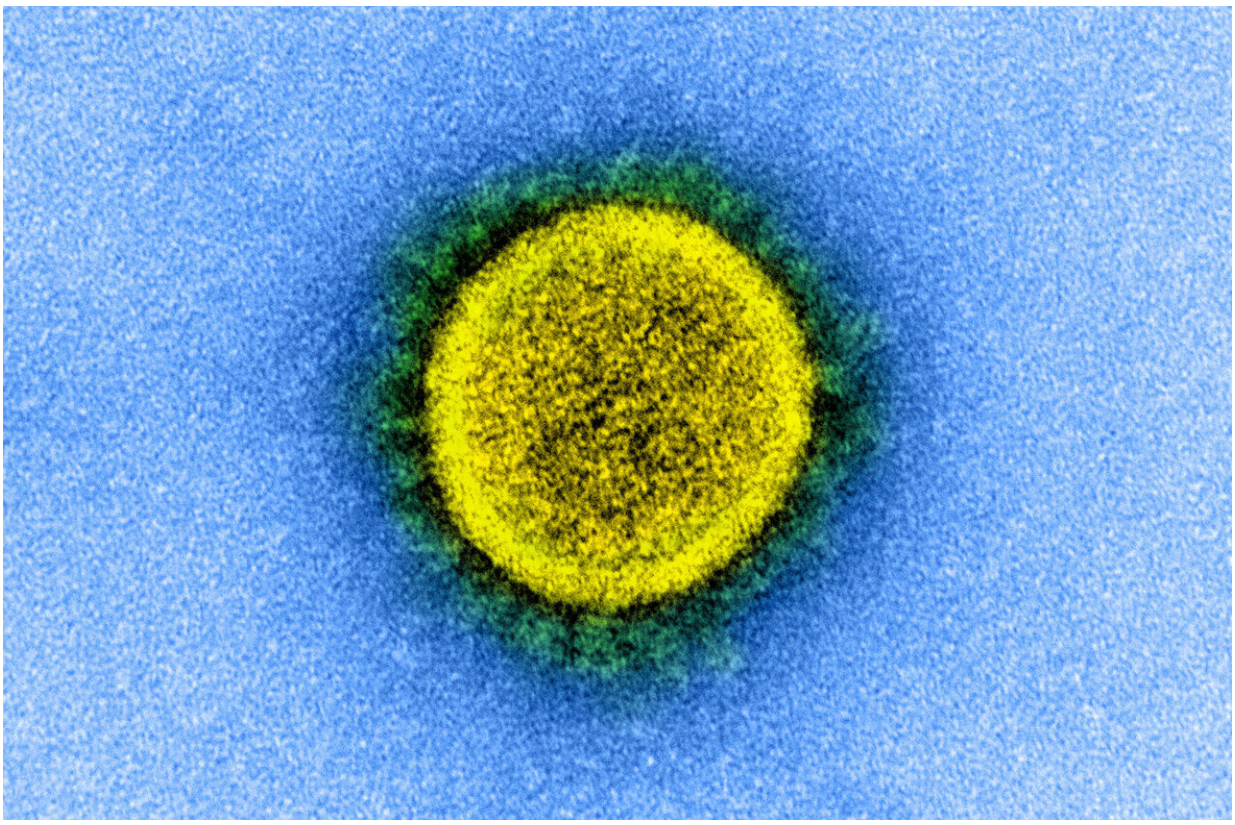
Simulations show super-spreading events pushed the exponential growth phase of COVID-19

September 23 2020, by Bob Yirka



SARS-CoV-2 (shown here in an electron microscopy image). Credit: National Institute of Allergy and Infectious Diseases, NIH

A trio of researchers, two with the Polish Academy of Sciences, the

other the University of Warsaw, has found evidence showing that super-spreader events pushed the exponential growth phase of COVID-19. In their paper published in the journal *Royal Society Open Science*, Marek Kochańczyk, Frederic Grabowski and Tomasz Lipniacki describe the factors that went into their pandemic computer simulations, and what those simulations revealed.

Early in the current pandemic, little was known about the SARS-CoV-2 virus, how it might spread, or how deadly it was. Scientists around the world began intensely studying the virus to learn more about it and determine how bad an outbreak might be. During the earliest phase of the pandemic, when it had not yet spread out of China, some researchers suggested the reproduction number (the number of people a single person infected with the virus was likely to infect) for the virus was 3.8—a number that suggested the virus was very likely to lead to a global pandemic. In their new effort using computer simulations, the researchers in Poland have found that the reproduction number might have been as high as 11 this past March and April—but their simulations also showed that such a high rate was only possible if there were super-spreader events.

Super-spreader events are those in which one or more infected people attend an event with many uninfected people, and in the process, infect a number of other people. A pandemic would start very slowly, but would accelerate if super-spreader events occurred—if infected people attended soccer games, for example, or concerts.

To come to these conclusions, the researchers studied real-world data in a computer simulation designed to show the progression of a pandemic. It showed that it would be easy to underestimate reproduction numbers in the early stages of a pandemic because the likelihood of viral spread at a super-spreader event would be small, because so few people had been infected. But after one such event led to more infections, and more

of those people attended other super-spreader events, the rate of transmission would increase dramatically. The researchers note that the history of the pandemic in the real world backed up their simulations. When countries, such as Spain and Italy, canceled large gatherings (super-spreader events) the spread of the pandemic slowed dramatically—even in the absence of a lockdown.

More information: Marek Kochańczyk et al. Super-spreading events initiated the exponential growth phase of COVID-19 with $\mathscr{R}$ 0 higher than initially estimated, *Royal Society Open Science* (2020). DOI: 10.1098/rsos.200786