PHYSICAL MATHEMATICS SEMINAR

Beyond Six Feet: A Guideline to Control Indoor Airborne Transmission of COVID-19

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ABSTRACT:

The current revival of the world's economy is being predicated on social distancing, such as the Six-Foot Rule of the CDC, which offers little protection from pathogen-bearing aerosol droplets sufficiently small to be mixed through an indoor space. The importance of indoor airborne transmission of COVID-19 is now widely recognized, but no simple safety guideline has been proposed to protect against it. We here build upon models of airborne disease transmission to derive a guideline that bounds the "cumulative exposure time", the product of the number of occupants and their time in an enclosed space. The bound depends on the rates of ventilation and air filtration, dimensions of the room, breathing rate, respiratory activity and face mask use of its occupants, and infectiousness of the respiratory aerosols. By synthesizing data from indoor spreading events with respiratory drop-size distributions, we estimate an infectious dose on the order of ten aerosol-borne virions. The new coronavirus is thus inferred to be an order of magnitude more infectious than its forerunner (SARS-CoV), consistent with the pandemic status achieved by COVID-19. Case studies are presented for classrooms and nursing homes, and an online app is provided to facilitate use of our guideline. Implications for contact tracing and quarantining are considered, appropriate caveats enumerated. Particular consideration is given to respiratory jets, which may substantially elevate risk when facemasks are not worn.

See http://www.mit.edu/~bazant/COVID-19 for the initial publication with John W. M. Bush, an online app by Kasim Khan, and a free, self-paced massive open online course (MOOC),10.S95x Physics of COVID-19 Transmission, which teaches the science behind the app.

TUESDAY, MARCH 2, 2021
2:30 PM – 3:30 PM

https://math.mit.edu/sites/pms/

https://mit.zoom.us/j/95597721876

Meeting ID: 955 9772 1876

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