Abstract Submitted
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Analyzing the dominant SARS-CoV-2 transmission routes towards an ab-initio SEIR model[1] SWETAPROVO CHAUDHURI, University of Toronto, SAPTARSHI BASU, Indian Institute of Science, ABHISHEK SAHA, University of California San Diego — Different transmission routes of the SARS-CoV-2 virus, and their role in determining the evolution of the Covid-19 pandemic are analyzed, in this work. Probability of infection caused by inhaling virus-laden cough droplets (initial, ejection diameters between $0.5-750\mu m$) and the corresponding desiccated nuclei that mostly encapsulate the virions post droplet evaporation, are calculated. At typical air-conditioned yet quiescent indoor space, for average viral loading, droplets of initial diameter between $10-50\mu m$ have the highest infection probability. However, by the time they are inhaled, the diameters reduce to about $1/6^{th}$ of their initial diameters. Combined with molecular collision theory adapted to calculate frequency of contact between the susceptible population and the droplet/nuclei cloud, infection rate constants are derived ab-initio, leading to a SEIR model applicable for any respiratory event transmission vector combination. Viral load, minimum infectious dose, sensitivity of the virus half-life to the phase of its vector and dilution of the respiratory jet/puff by the entraining air are shown to mechanistically determine variation in the basic reproduction number $\mathcal{R}_\prime$, from first principle calculations. Ref: https://arxiv.org/abs/2007.13596

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