PHYSICS AND COVID-19
LA FÍSICA Y LA COVID-19

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In a recent effort to contribute fighting the COVID-19 pandemic, The American Physical Society has identified a collection of relevant articles published in its journals, and made them freely available online [1]. If one examines the approximately 25 papers in the list that have been published in the years 2019 and 2020, it is found that most of them deal with networks (see, for example, "Predicting the speed of epidemics networks" [2]) and just one can be classified as biophysical ("Finite T phase behavior of viral capsids as oriented particle shells" [3]). Regardless of what criteria were used to construct the list, the fact is that theoretical papers overwhelmingly dominate –a phenomenon that can be jokingly called THEOVID-19. A few facts explaining this. One is that theoretically understanding the spread of the virus, determining if measures taken by governments influence its dissemination, and suggesting concrete actions to control the pandemic, are goals of the uttermost importance. Another reason is that theoretical research is the logical way to go if you must stay at home for a few months. Indeed, an enthusiastic group of Cuban physicists and mathematicians have been systematically involved in that kind of work during the pandemic, in close coordination with the Cuban Ministry of Health.

Still, I really miss the presence of "more conventional" physics associated with the COVID-19 era, especially when there is plenty of room for it. The transmission of infections from individual to individual and the usefulness of face masks is a red hot topic these days, closely connected with fluid dynamics. For example, the paradigm that an inter-personal distance of the order of two meters is enough to avoid contamination from an infected person has been challenged by a recent Insight in a top medical journal [4], but the claim is mostly based on an earlier "hard-core" physics article reporting sophisticated visualization and mechanical modeling of human sneezing and coughing [5]. This is just a prominent example: the physics of contamination through droplets (with emphasis in aerosols, i.e., particles smaller than a few microns) is all over the literature: classical mechanics, thermodynamics and statistics are essential ingredients in the area. Curiously, a large proportion of that body of work seems to be authored by chemical and mechanical engineers.

Finally, is the subject of the interaction between droplets and cloths, and other porous materials –quite relevant in evaluating the effectiveness of face masks in stopping airborne infection. The physical techniques used to quantify the particles penetrating masks range from light scattering to contemporary nanotechnology [6]. However, physicists have largely left the subject to other colleagues. Fortunately, over the last few years physicists have used high speed cameras to study in detail how liquid droplets interact with fabrics [7]. This is a return to simplicity –seeing is believing– and also to fundamental physics.

These days, physicists coming from much broader research fields than one might expect –from organic electronics to dark matter– are joining the fight against COVID-19 in many ways: creating a fluorescence test based on the viral load of saliva, designing a ventilator optimized for use in poor countries, attempting to fabricate face masks using cotton candy machines. . . [8]. A whole new brand of "experimental physics" that, besides its usefulness to save lives, has the glamour of being well suited for physics laboratories with scarce resources. Like those in Cuba.

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