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# A Multi-Physics Model for the Prediction of Coronavirus Inactivation in Populated Rooms using 222 nm Far-UVC

**A. G. Buchan[1], C. Sannassy[1], L. Yang[2], K. D. Atkinson[3], D. Welch[4] , D. J. Brenner[4]**

[1] School of Engineering and Materials Science, Queen Mary University of London, E1 4NS, UK, a.buchan@qmul.ac.uk, https://www.sems.qmul.ac.uk/staff/a.buchan

[2] School of Water, Energy and Environment, Cranfield University, MK43 0AL, UK, liang.yang@cranfield.ac.uk, https://www.cranfield.ac.uk/people/dr-liang-yang-23276693

[3] Faculty of Energy Systems and Nuclear Science, Ontario Tech University, Oshawa, Ontario, L1G 0C5, Canada, kirk.atkinson@uoit.ca,

[4]Center for Radiological Research, Columbia University Irving Medical Center, New York, NY, USA, djb3@cumc.columbia.edu

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Transmission of SARS-CoV-2 by aerosols has played a significant role in the rapid spread of COVID-19. Indoor environments pose a particular risk and, consequently, many efforts have focused on ways to disinfect air. Recently it was realised that 222 nm UVC light (far-UVC) can be employed to disinfect air of populated rooms [1]. Unlike standard 254 nm UVC, far-UVC is minimally hazardous to the skin and eyes, and therefore is safe to use around humans while still being an effective antimicrobial. This is potentially significant in the fight against all airborne diseases as it requires no movement or stiring of air. It can therefore be used effectively in poorly ventilated buildings, and mitigates the potential to spread the virus by forcibly agitating the air to transport it to other removal mechanisms.

Quantifying the efficacy of far-UVC inactivation of SARS-CoV-2 within a room is complicated. Each room is unique, with its own atmospheric conditions with spatially varying UVC intensities. Assessing the transport and inactivation of virus is therefore a multiphysics (radiation-fluids) problem, perhaps best suited to computational modelling. We present the first high-fidelity model for simulating coupled radiation transport and CFD for such a purpose [2]. The framework (WYVERN) has demonstrated far-UVC to provide effective removal of virus when used with ventilation of simplified rooms (up to 85%), and we present its use in complex scenarios of rooms used for hospitality. Again it demonstrates high efficacy in virus removal but also it advises on the placement of lamps for improved air disinfection.

## REFERENCES

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