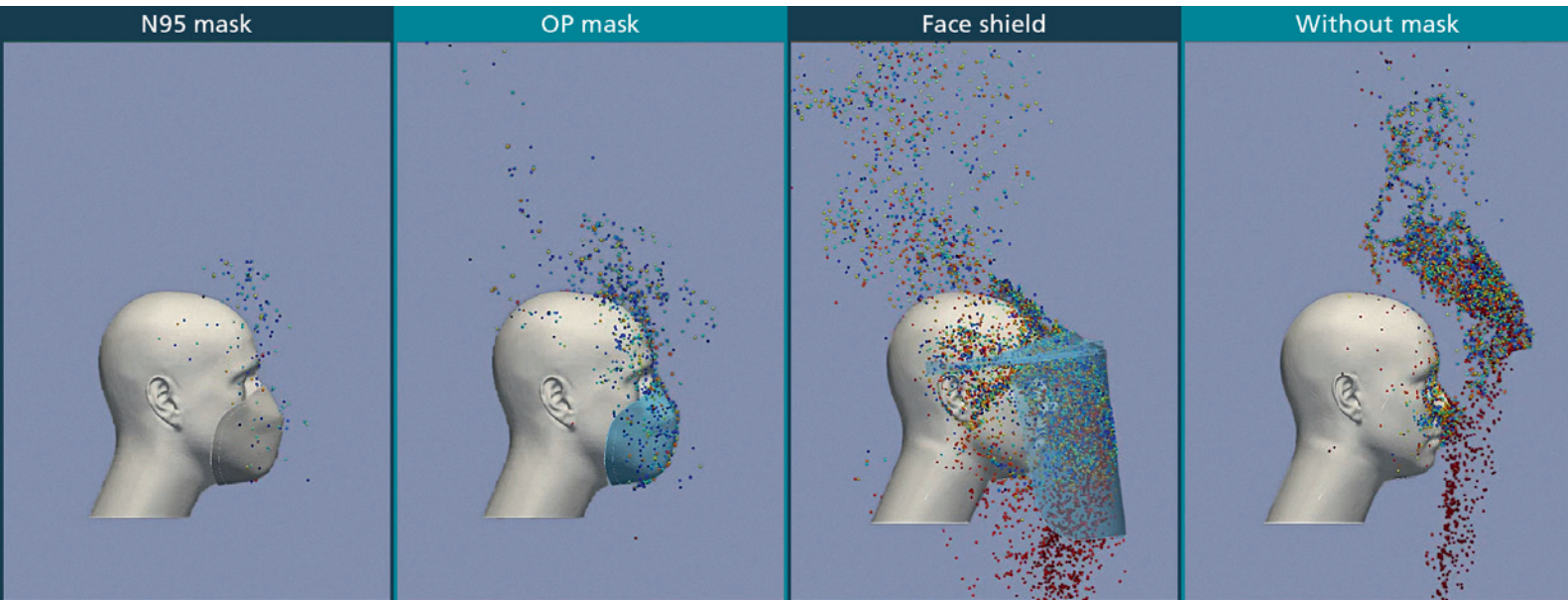


AVATOR – How Do Aerosols Spread Indoors?



Different types of protective mouth-nose coverings prevent the spread of aerosols to varying degrees.

The Covid-19 pandemic has made many people aware that infectious aerosols play a major role in the spread of disease. In the project “AVATOR” (Anti-Virus Aerosol: Testing, Operation, Reduction), several Fraunhofer institutes are investigating ways to assess the risk and reduce the danger of infection by aerosol-borne viruses. For this purpose, an interdepartmental team at ITWM is developing a multiscale simulator which calculates the aerosol propagation in indoor environments.

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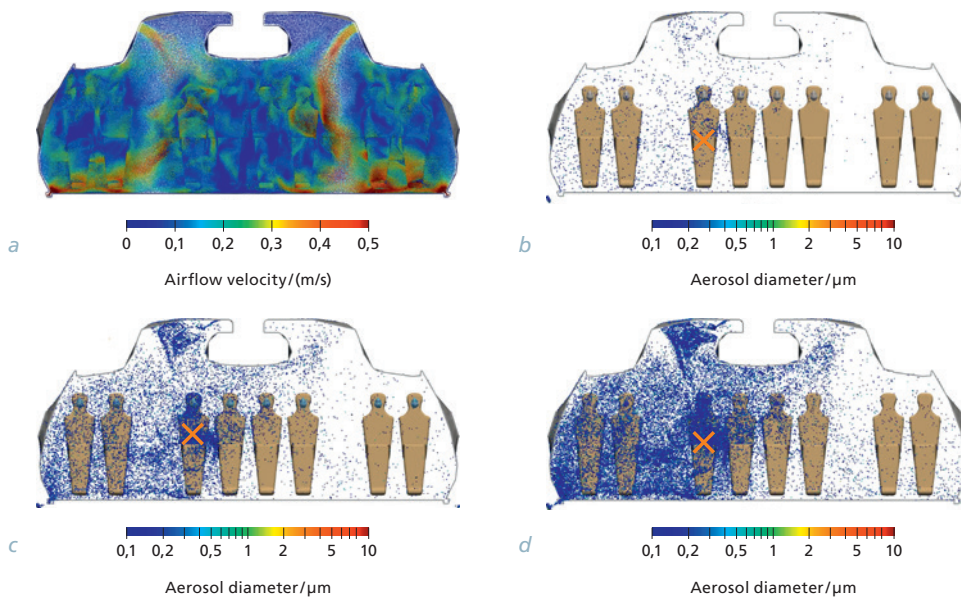
Ventilation to fight Corona? SARS-CoV-2 can be transmitted via aerosols – airborne droplet nuclei smaller than ten micrometers. This is also possible in certain situations over greater distances, for example when many people congregate in insufficiently ventilated indoor spaces.

Digital twins simulate situation and form basis for concepts

Against this background, distance, the number of people in rooms, and indoor air hygiene and ventilation are important building blocks in the pandemic. Especially for educational in-

stitutions, hospitals, care facilities, hotels, airplanes or trains and offices as well as production facilities, the researchers in the project are looking for answers to hygienic questions as well as practical solutions to prevent the spread of aerosol infections.

In indoor environments, aerosols do not simply disappear, but spread throughout the room over time. In addition to cleaning technologies for indoor air, AVATOR also investigates the spread of aerosols and derives hygiene concepts for specific applications. The researchers are modeling the dispersion mechanisms using ITWM simulations



Simulation scenario airplane – How do aerosols disperse in the interior? Aerosol dispersion starting from the marked person with different masks: a. Airflow velocity; b. N95 masks; c. OP masks; d. without masks

ITWM expertise of many years helps with implementation

Dr. Ralf Kirsch, team leader “Filtration and Separation” of the “Flow and Materials Simulation” department, adds: “In our work, we at ITWM benefit greatly from the fact that we can draw on a broad spectrum of expertise – in this case, our many years of experience in the field of modeling and simulation of filters are very helpful.”

technologies. These findings are finally tested in laboratory environments as well as validated in real environments. The project results will then lead to new concepts for reducing the risk of infection with SARS-CoV-2.

In this way, sensible hygiene measures can be developed and the effectiveness of existing ones validated. AVATOR is part of the Fraunhofer Society’s “Fraunhofer versus Corona” program and runs until September 2021.

Multiscale approach takes several components into account

The multiscale approach also incorporates fine details into long-term observations – such as the type of individual protective equipment. Which mouth-nose covering protects how? The researchers then use the simulation results to derive a risk assessment that can be used to compare different indoor air concepts for each scenario.

In parallel to the simulation-based assessment procedures for air dispersion, the participating institutes are developing various air purification

 Detailed information about the project including simulation videos www.itwm.fraunhofer.de/avator_en

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