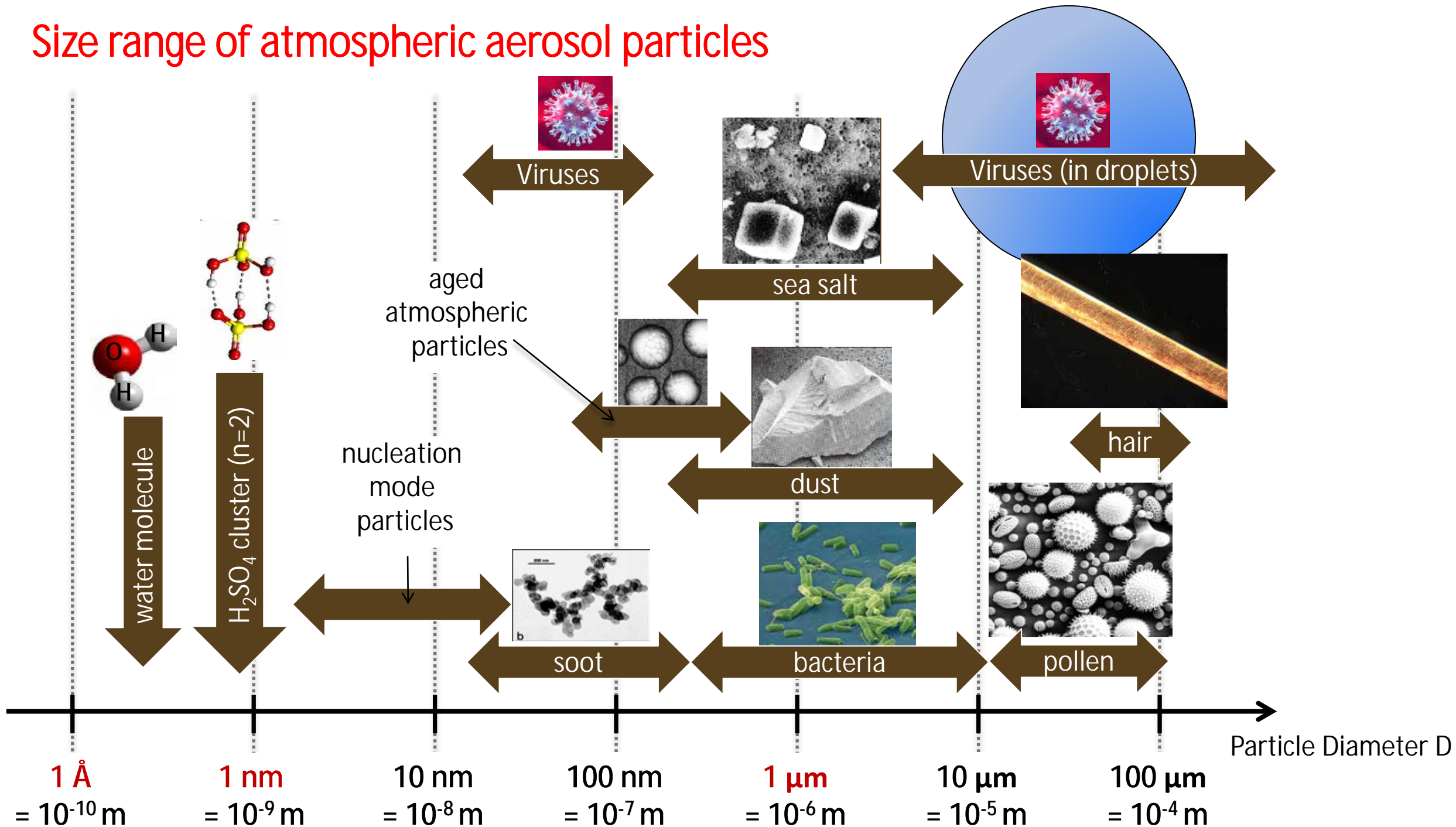


Virus protection in classrooms and other indoors

A. Mayer, H. Burtscher, J. Czerwinski, Th. Lutz, J. Mayer, R. Mayer, B. Rothen-
Rutishauser, T. Rüggeberg, P. Specht, E. Weingartner



Size range of atmospheric aerosol particles



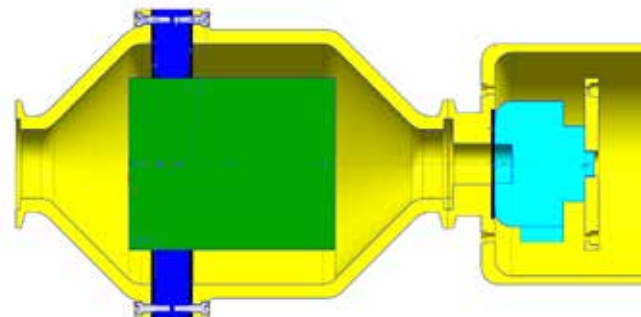
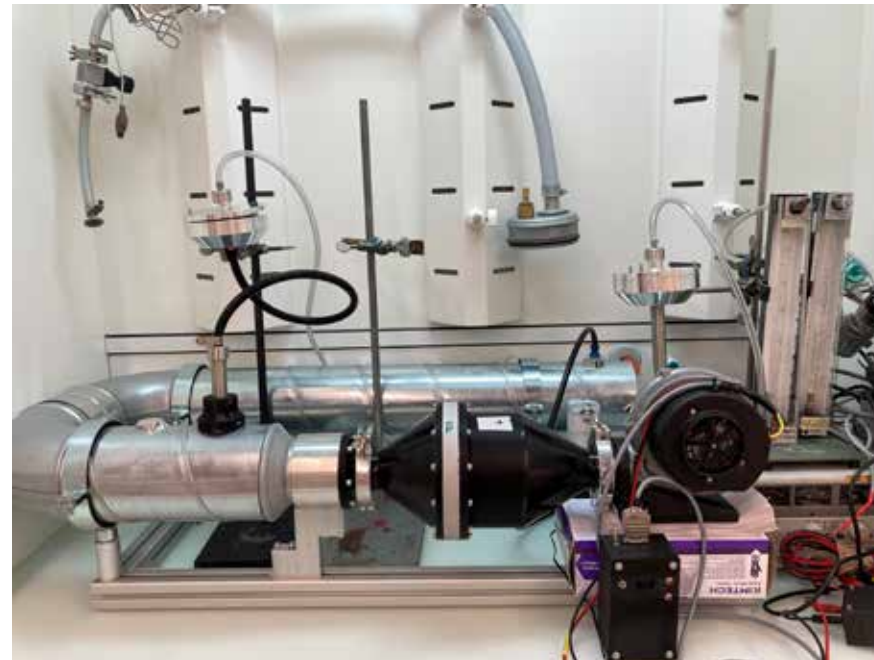


Tested Filters

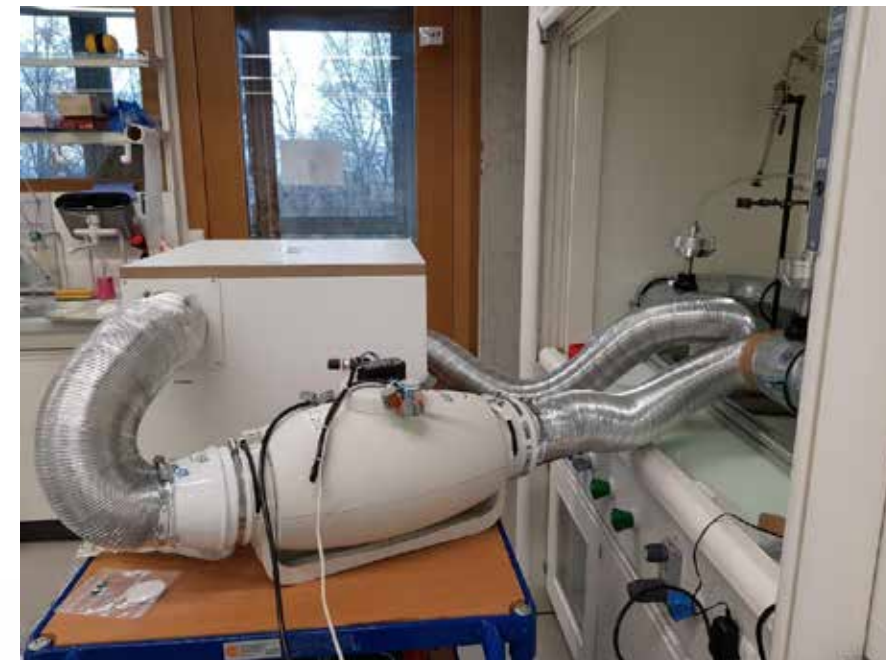
Fibre-filters



several ceramic-filter



UV-devices





Results of filter-tests

- The filters behave the same for viruses as for aerosol particles
- Efficiencies up to almost 100% are achieved
- Pressure drop typically a few 100Pa

With existing filter technology, efficient cleaning is possible when particles/viruses reach the filter before they reach others

The ceramic wall flow filter

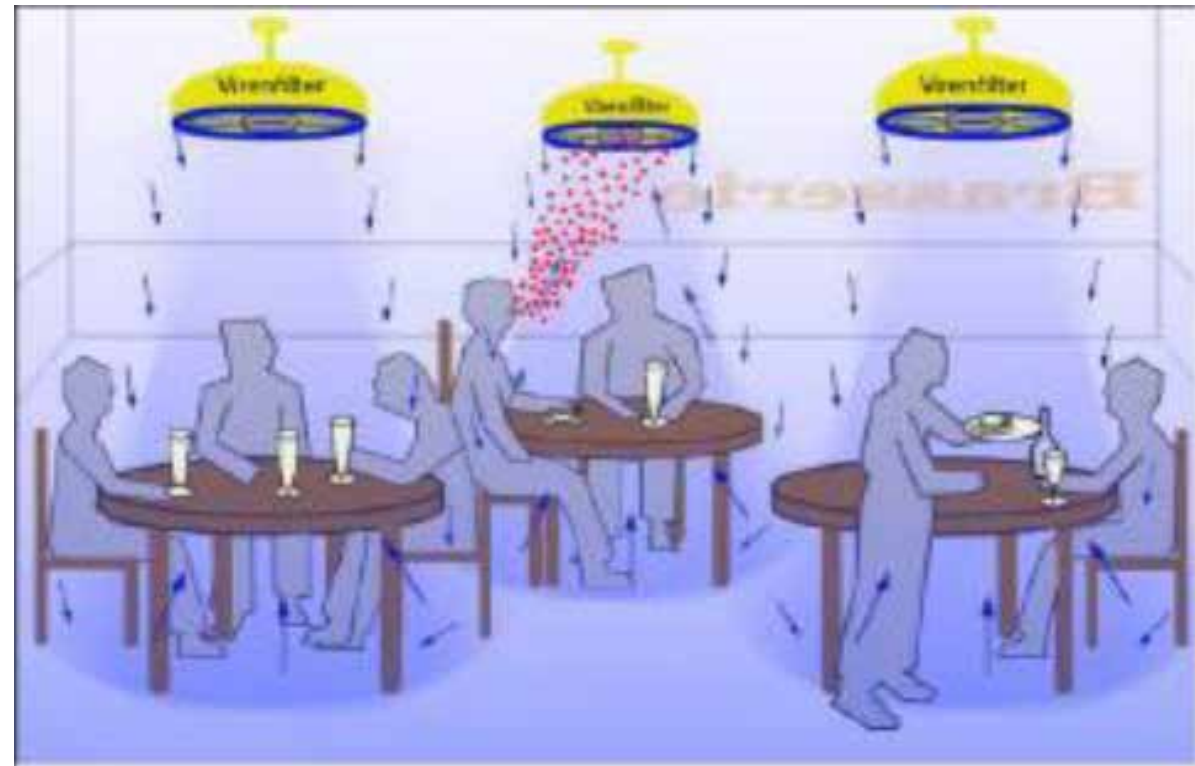


- High efficiency, filters with hierarchic pore structure also when new
- compact
- easy to clean
- can be heated
- mass product (GPF)

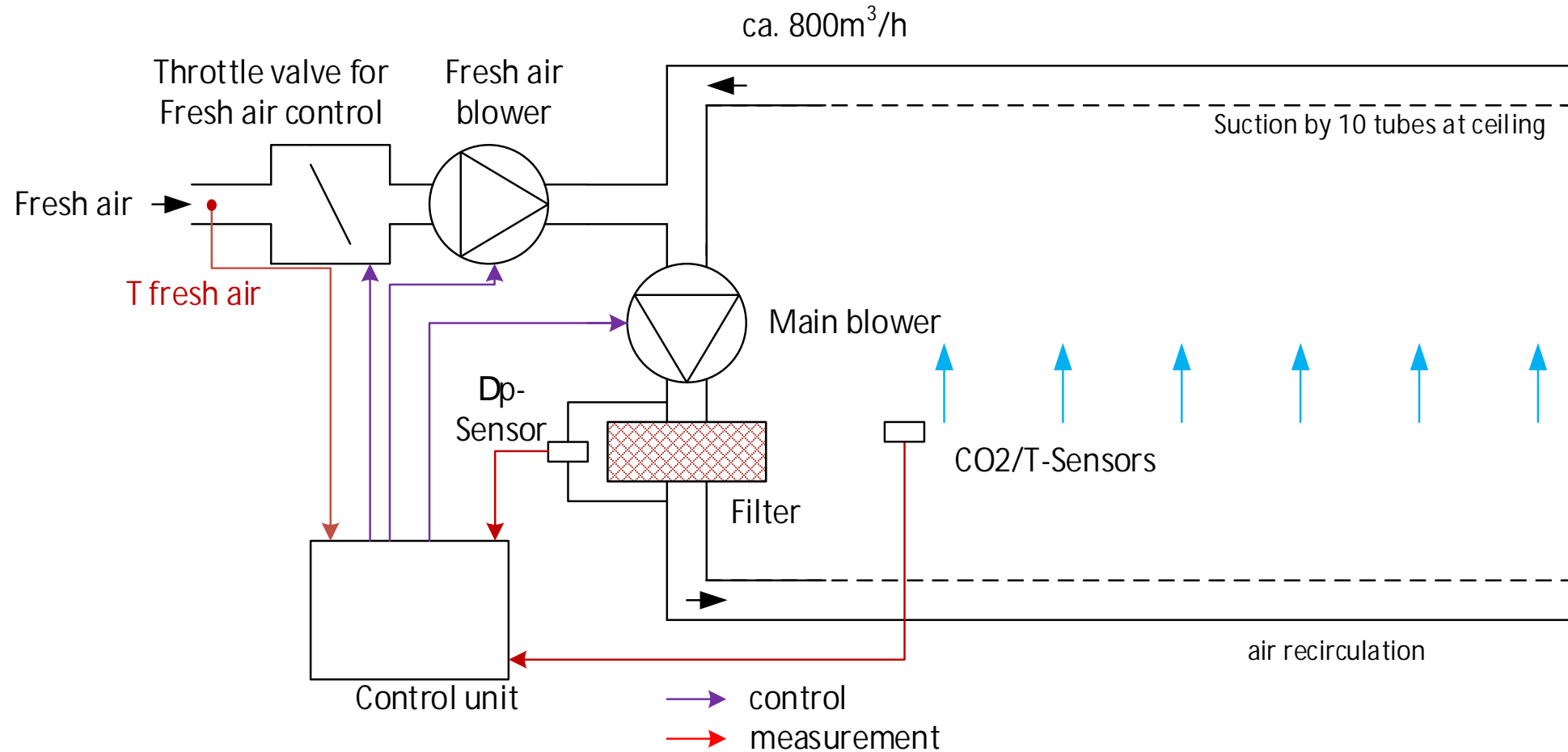




Approach:
vertical suction upwards

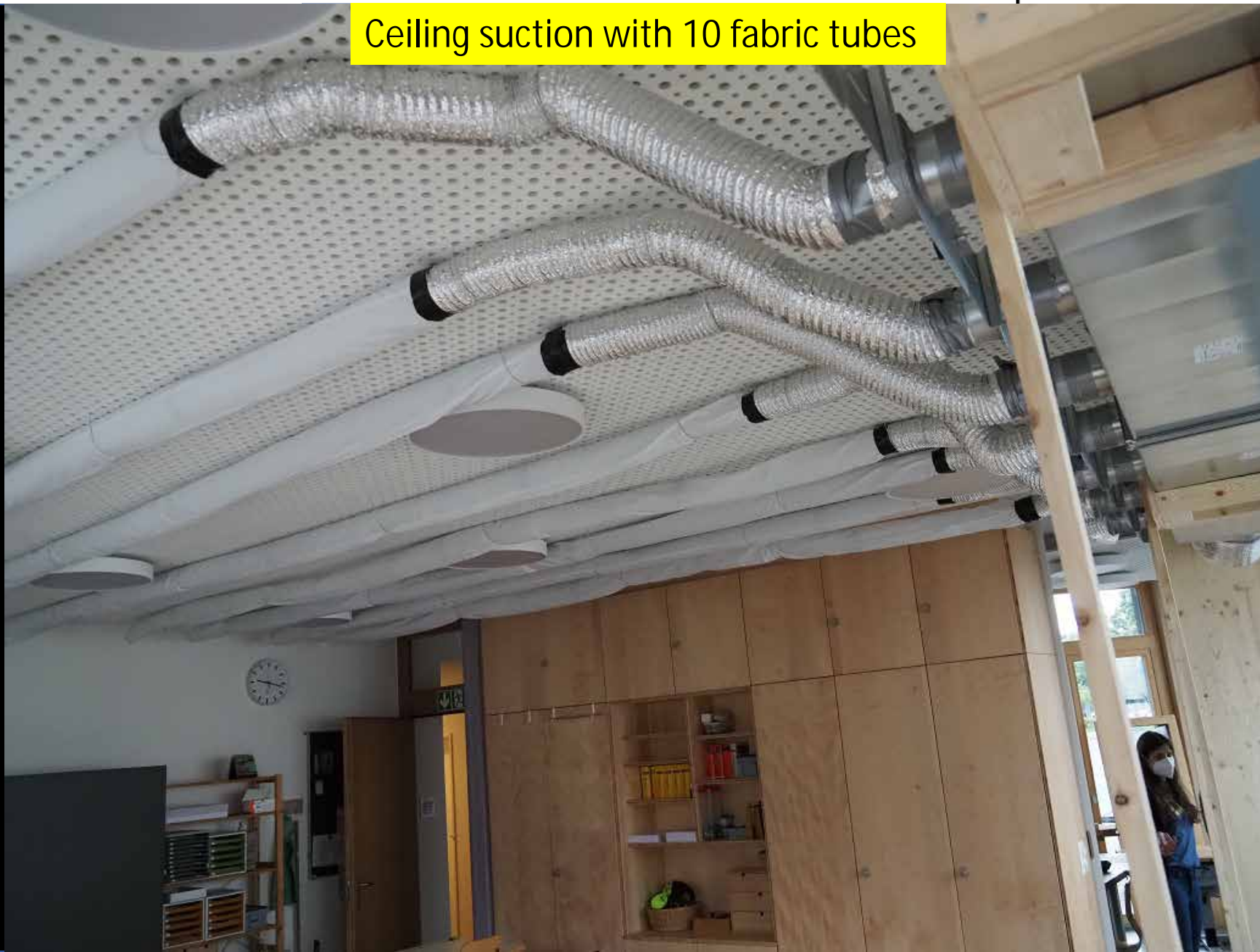


our approach in a classroom

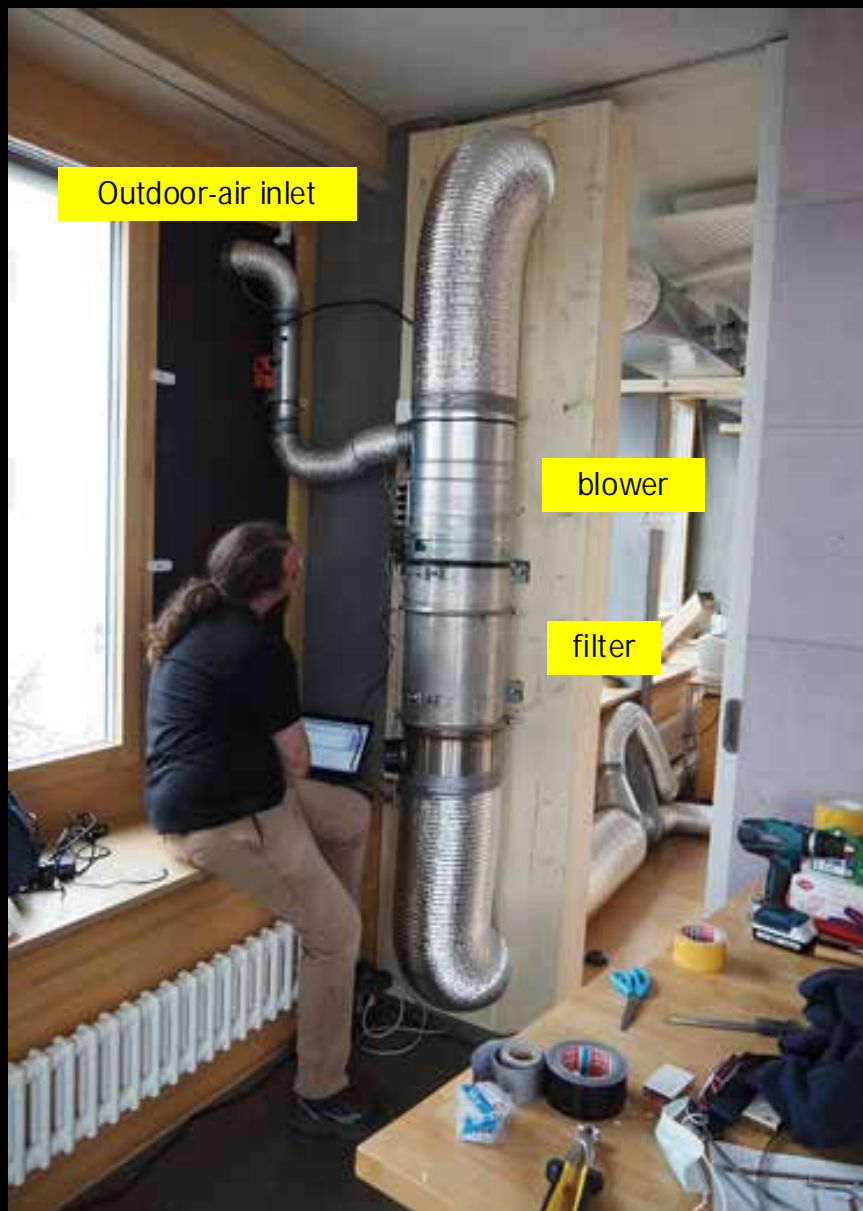




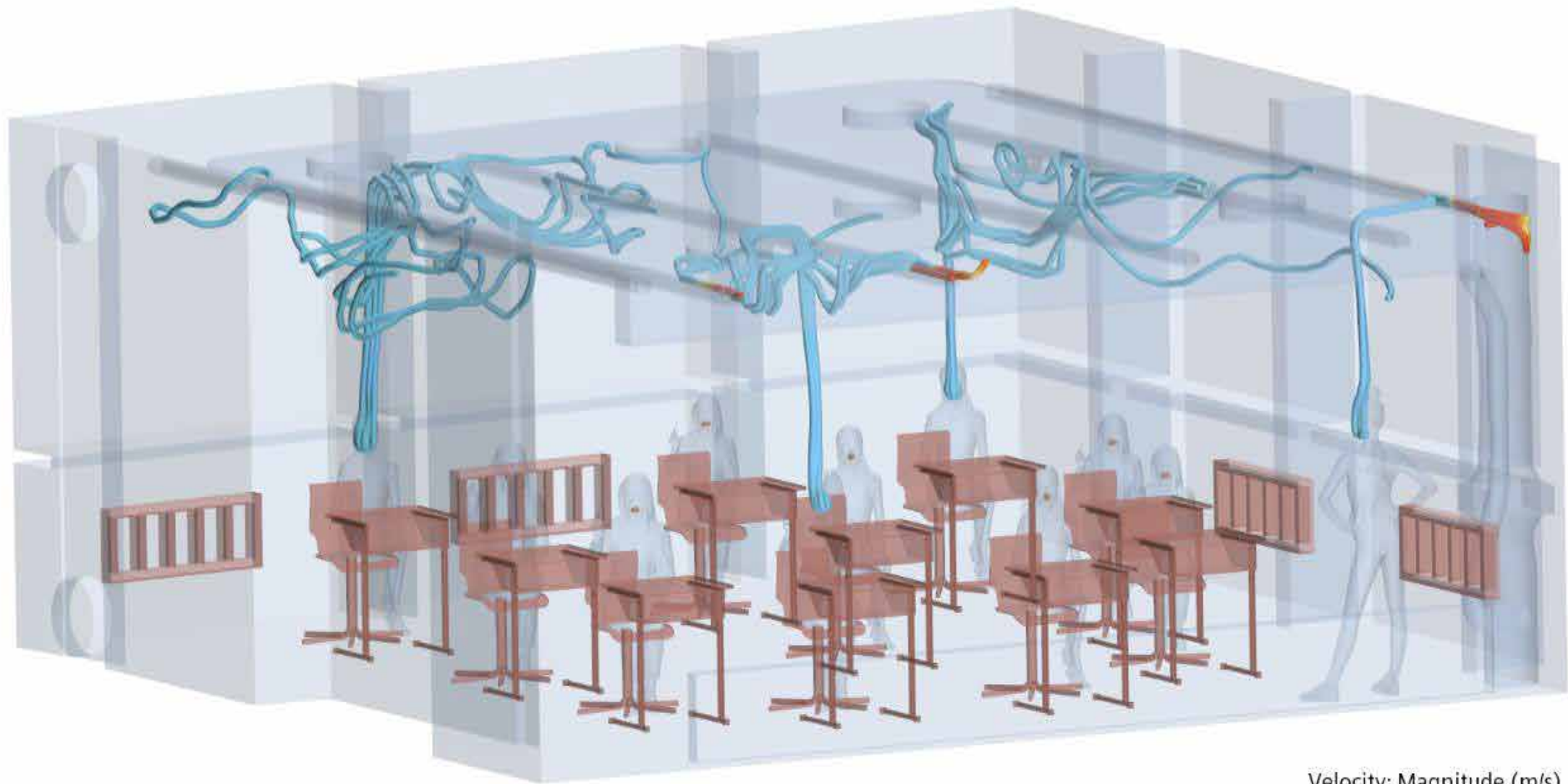
Ceiling suction with 10 fabric tubes



Blower, filter, control unit



Flow recirculation by fabric-tubes

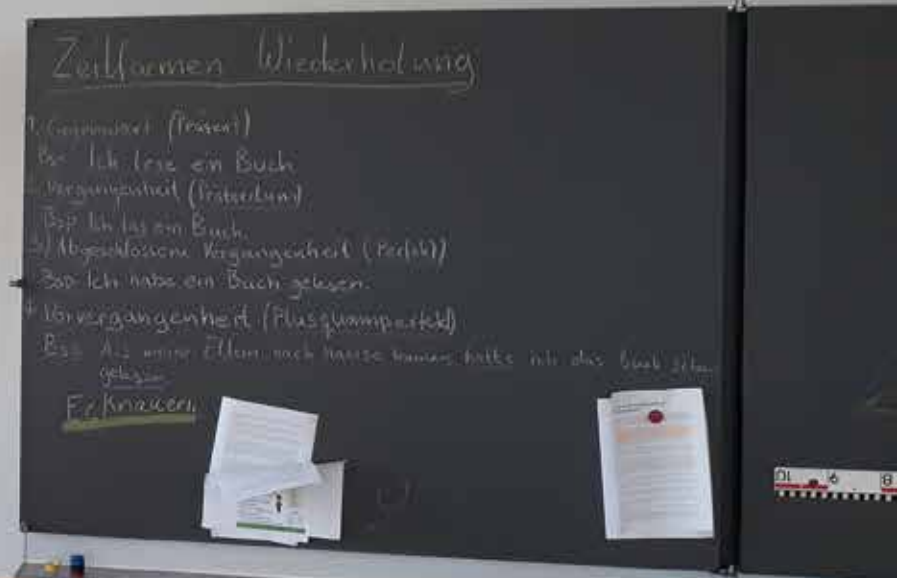




Zeitformen Wiederholung

- 1. Gegenwart (Präsens)
Bsp. Ich lese ein Buch.
- 2. Vergangenheit (Präteritum)
Bsp. Ich las ein Buch.
- 3. Abgeschlossene Vergangenheit (Perfekt)
Bsp. Ich habe ein Buch gelesen.
- 4. Unvergangenheit (Plusquamperfekt)
Bsp. Als meine Eltern nach Hause kamen, hatte ich das Buch schon gelesen.

Erkennzeichen

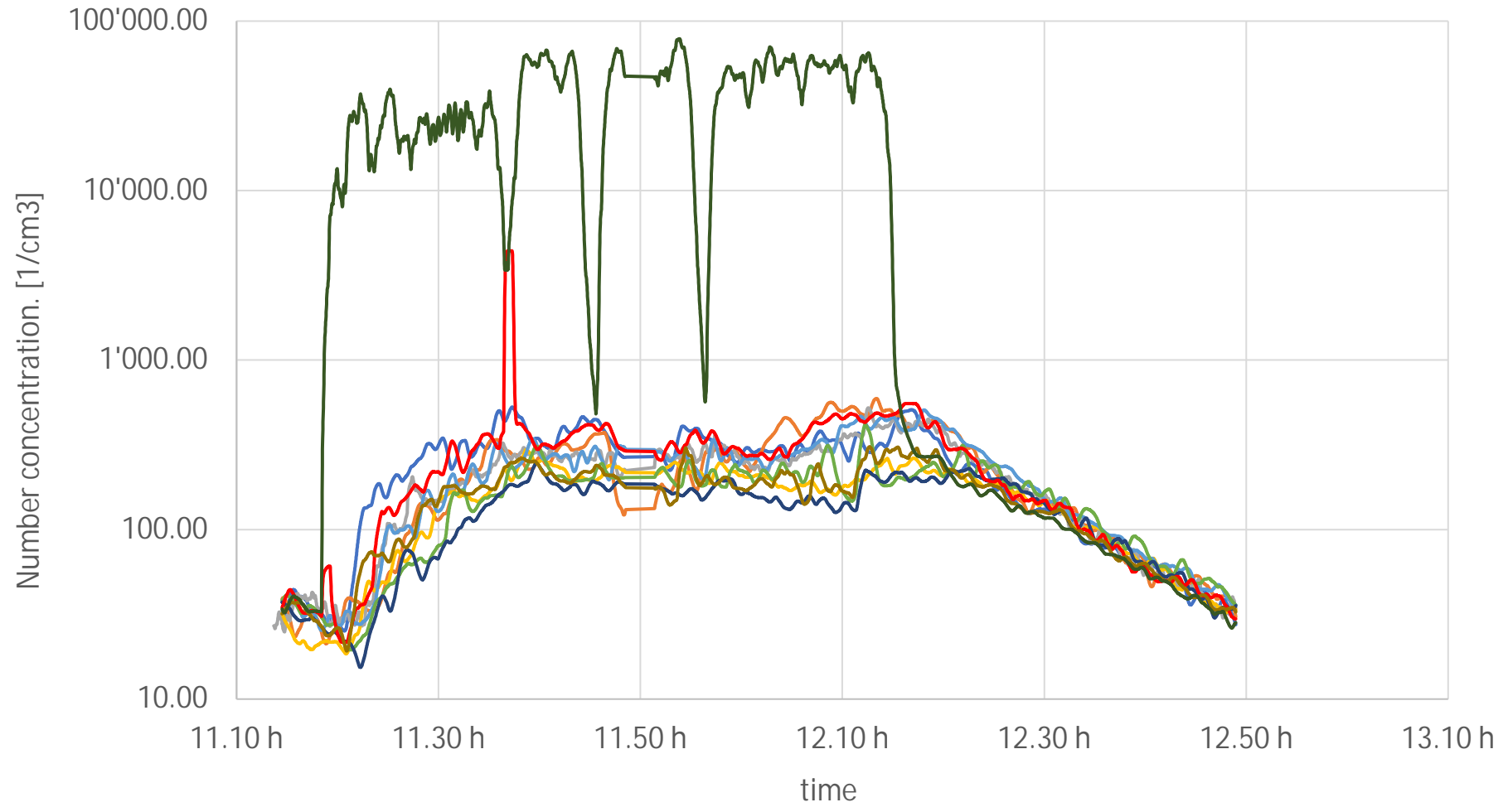




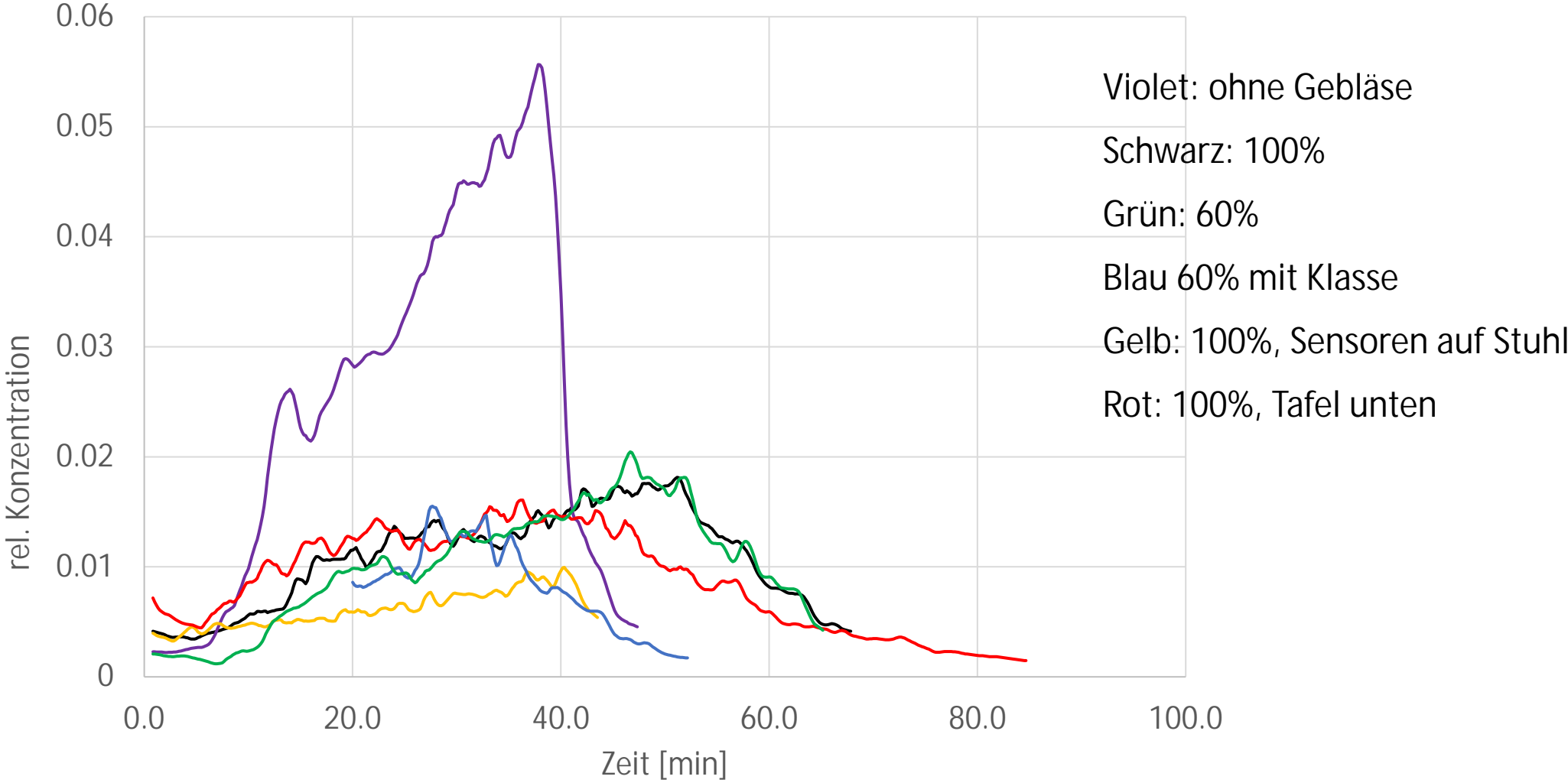
setup



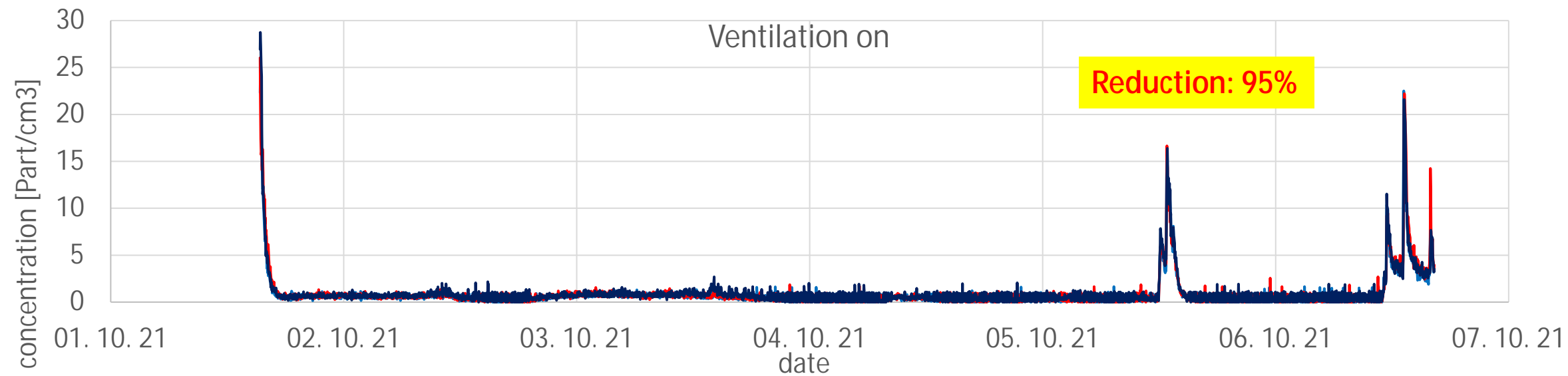
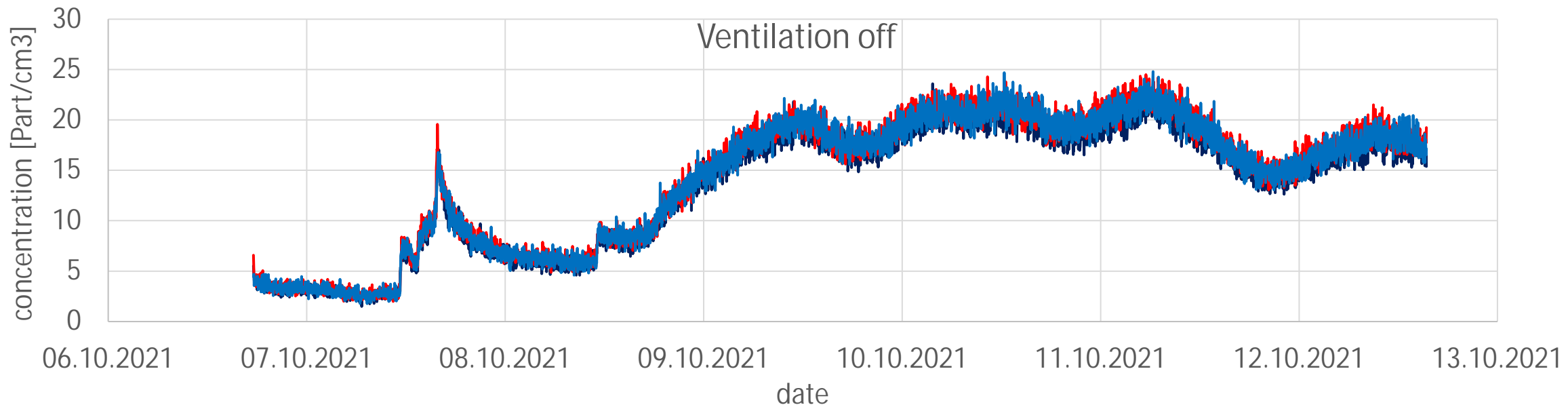
Concentration as function of time



Mittelwerte



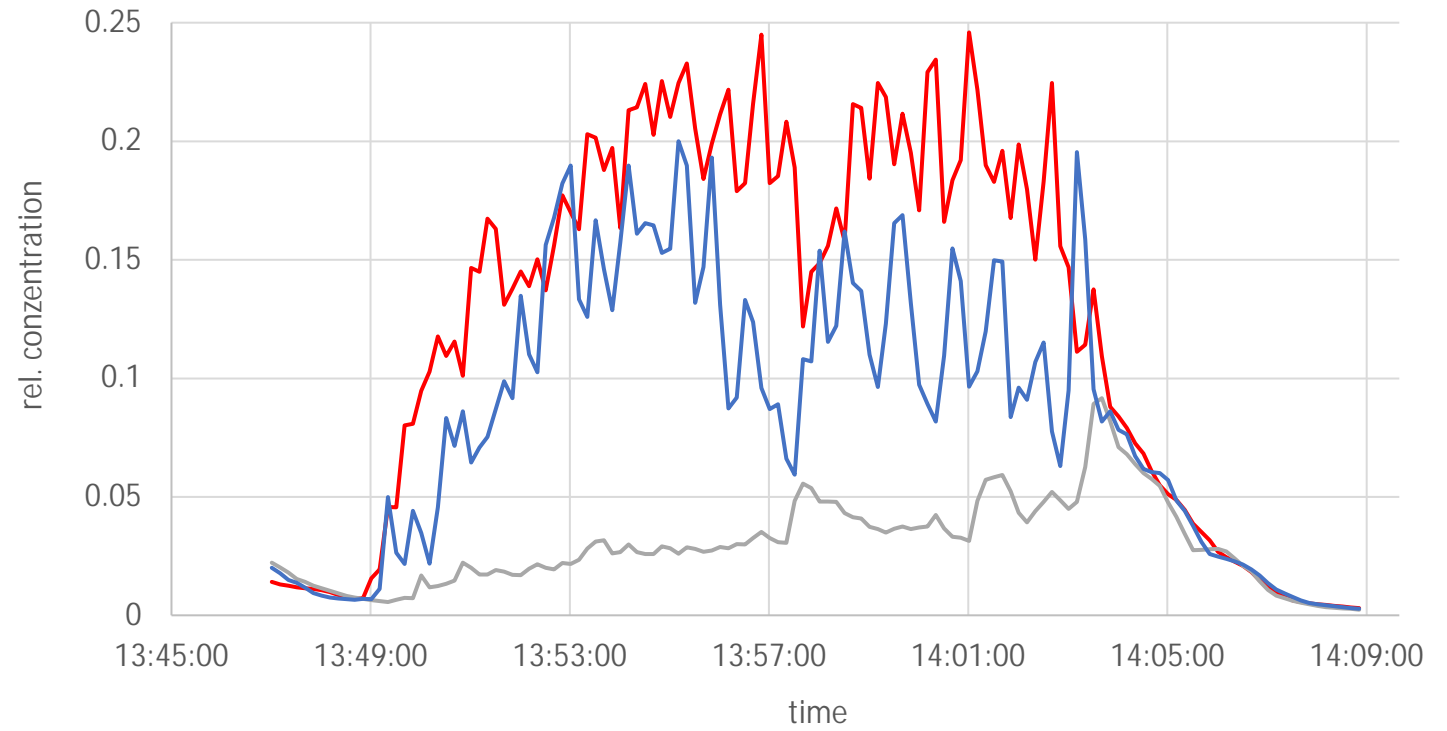
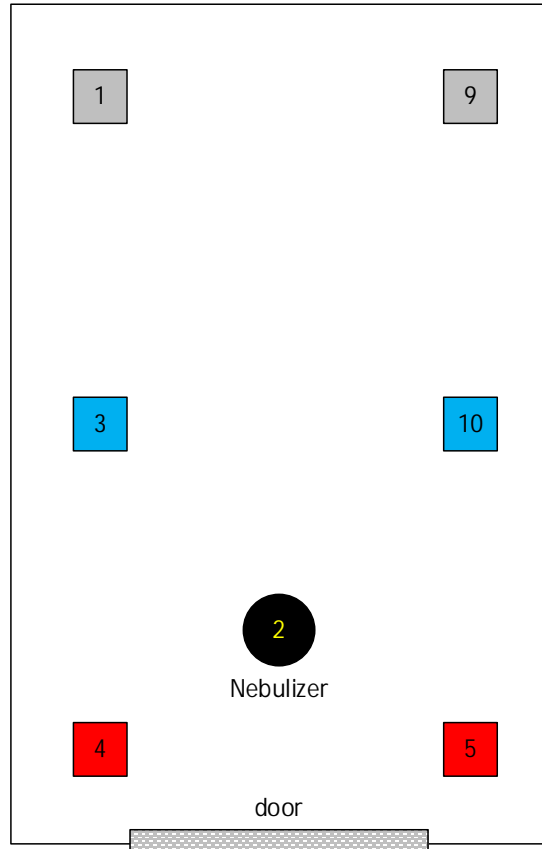
Ambient air filtration





Other applications

- **Elevator cabin: pilot installation at EMCH**
- **Hospital: installation allowing multiple occupancy with infectious patients**





Conclusions

- **Effective filtration possible**
- **Main problem: flow control**
- **Approach: laminar flow, vertically upwards**
- **Important: keep noise level low**
- **Topic also after 'corona' of importance:
other infectious diseases
reduce particulate pollution from outside**

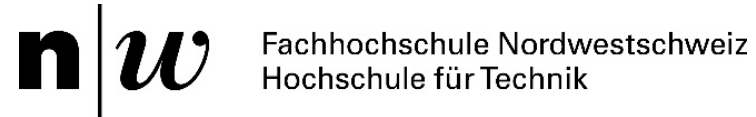


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