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Applications of machine learning in engineering acoustics

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Machine learning for...

I. Noise control

II. Architectural acoustics

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I. Noise control

Can we quantify sound absorption after the solution is installed?



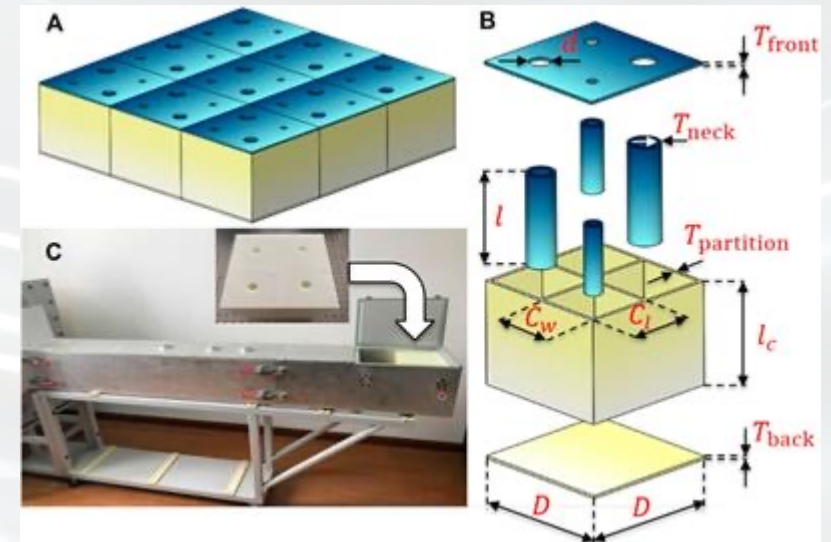
Courtesy of Ecophon Saint-Gobain



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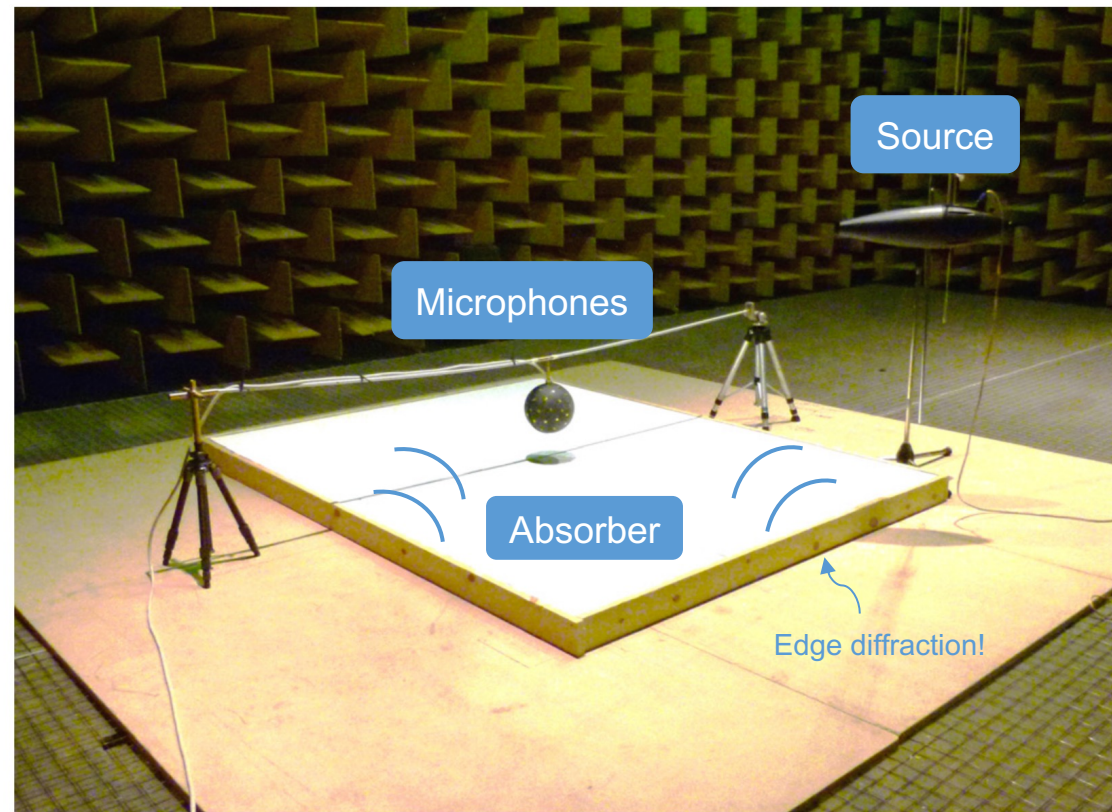
Courtesy of Ecophon Saint-Gobain



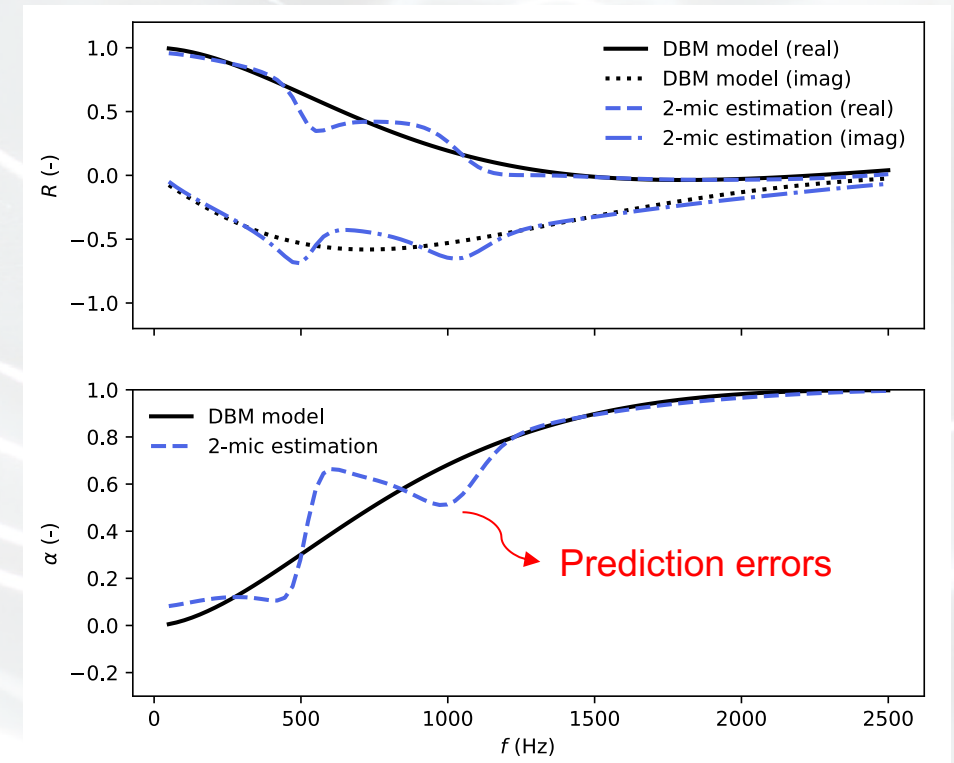
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I. Noise control

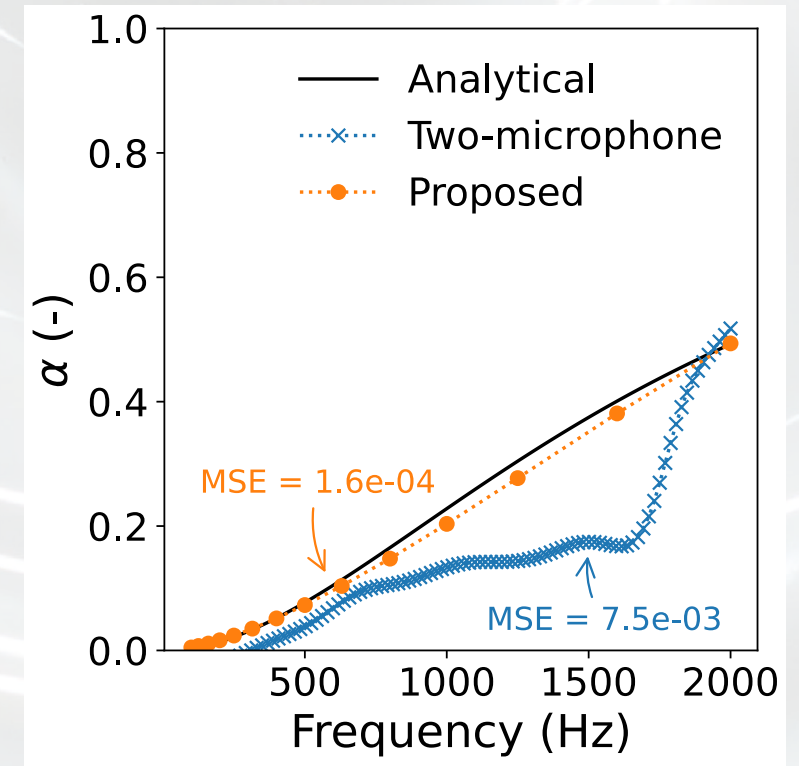
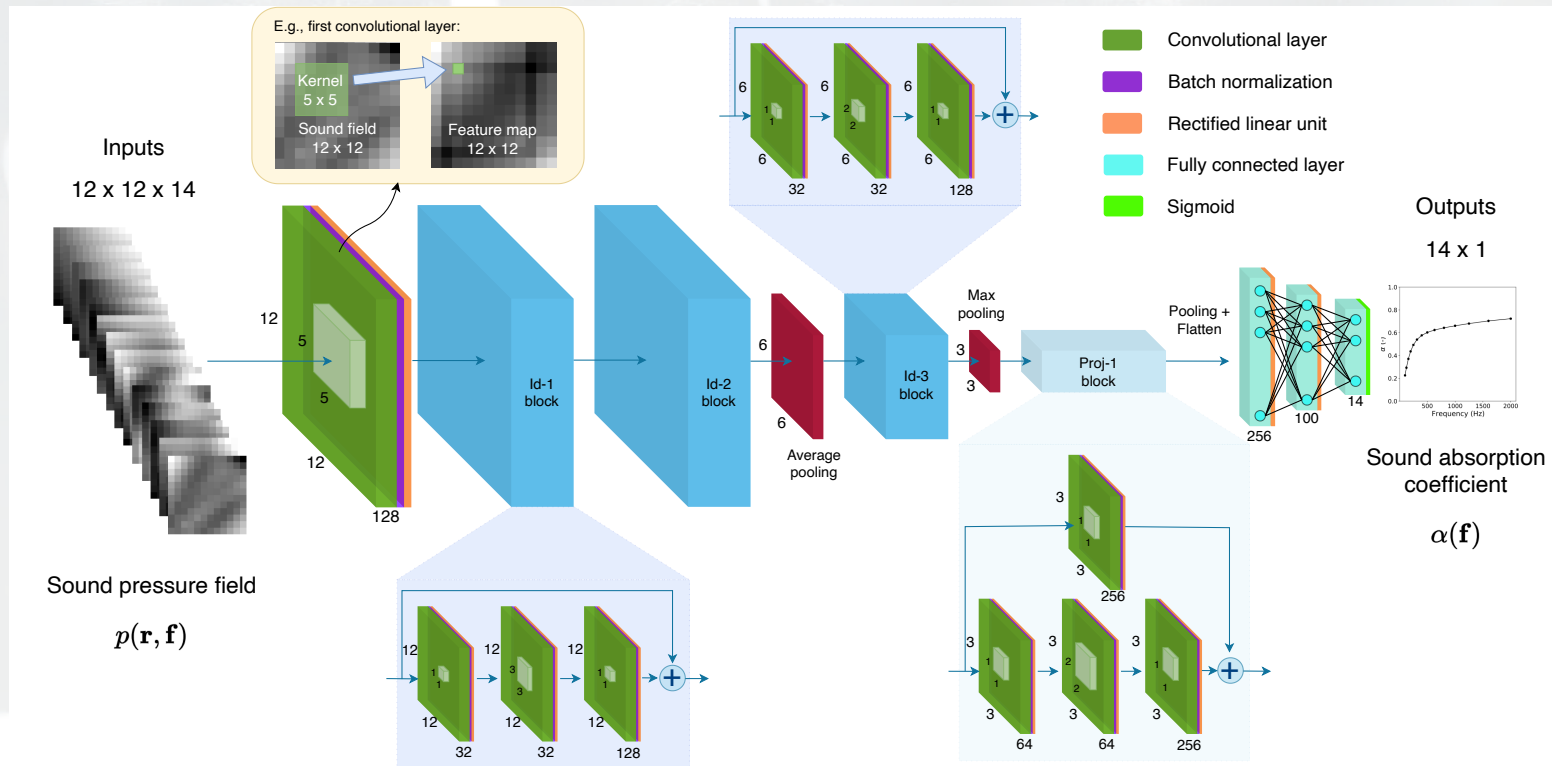


Courtesy of Richard et al., J. Acoust. Soc. Am. 141(6), 2018



I. Noise control

Superior predictions



Zea et al., *Sound absorption estimation of finite porous samples with deep residual learning*, J. Acoust. Soc. Am. **154**(4), 2321–2332 (2023)

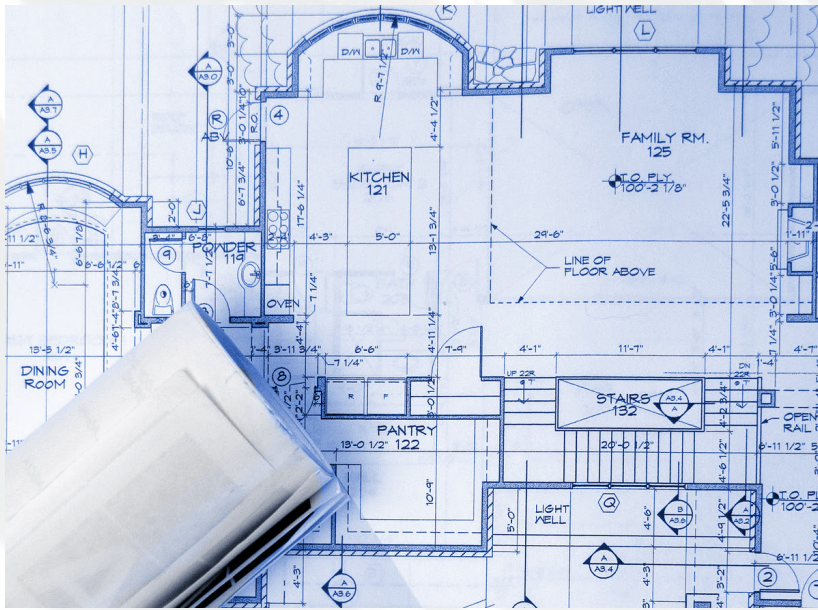
Machine learning for...

I. Noise control

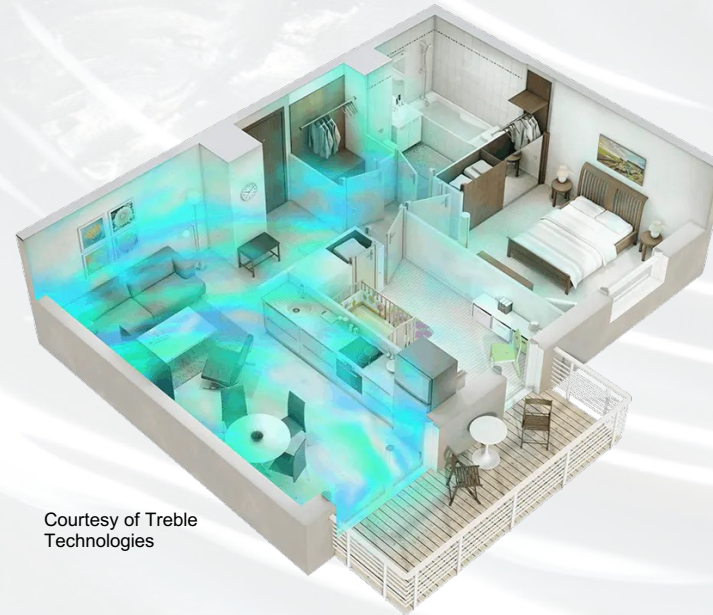
II. Architectural acoustics

II. Architectural acoustics

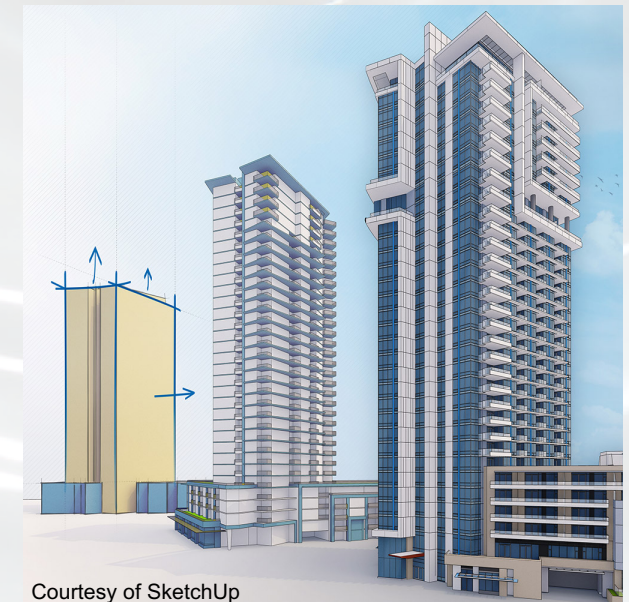
Can we predict how the apartments will sound before they are built?



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Courtesy of Treble Technologies



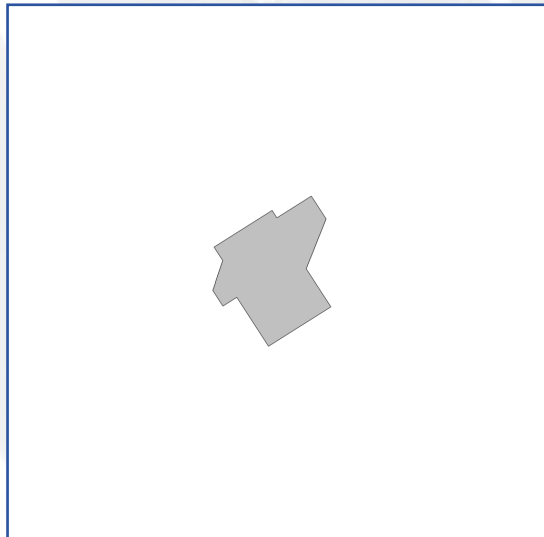
Courtesy of SketchUp



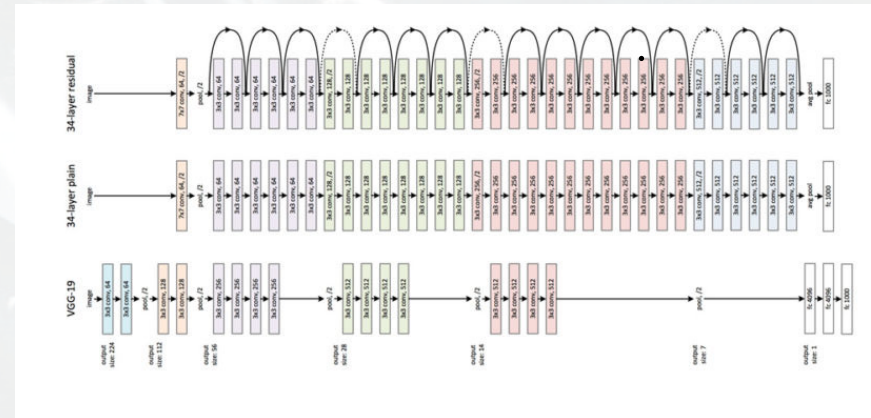
II. Architectural acoustics

Resonances: What frequencies are most problematic for noise?

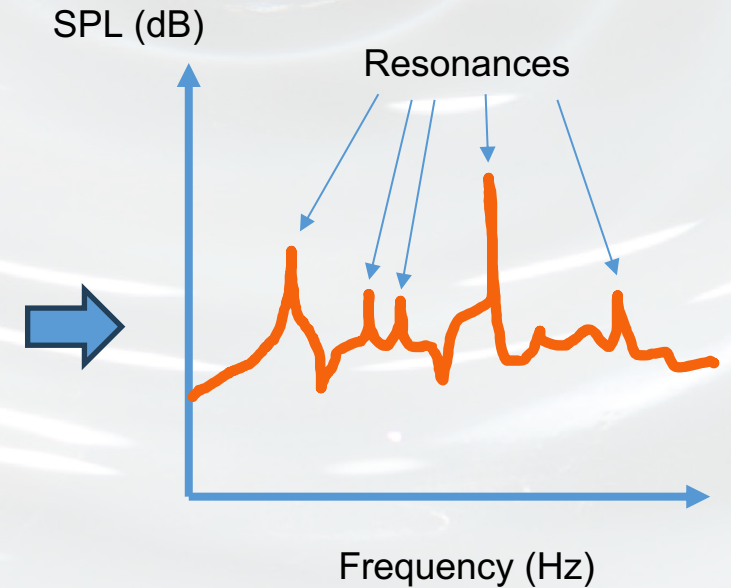
Room geometry



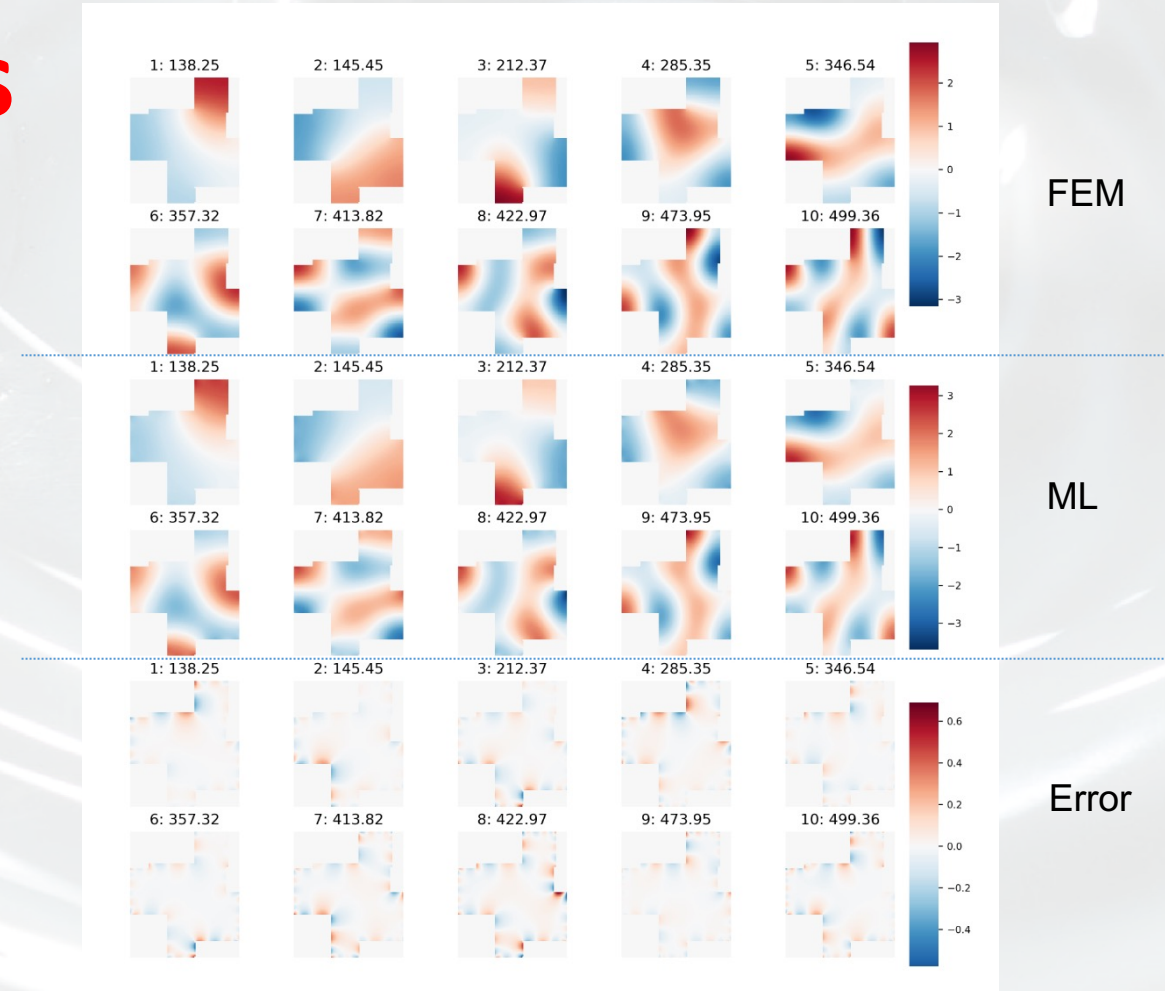
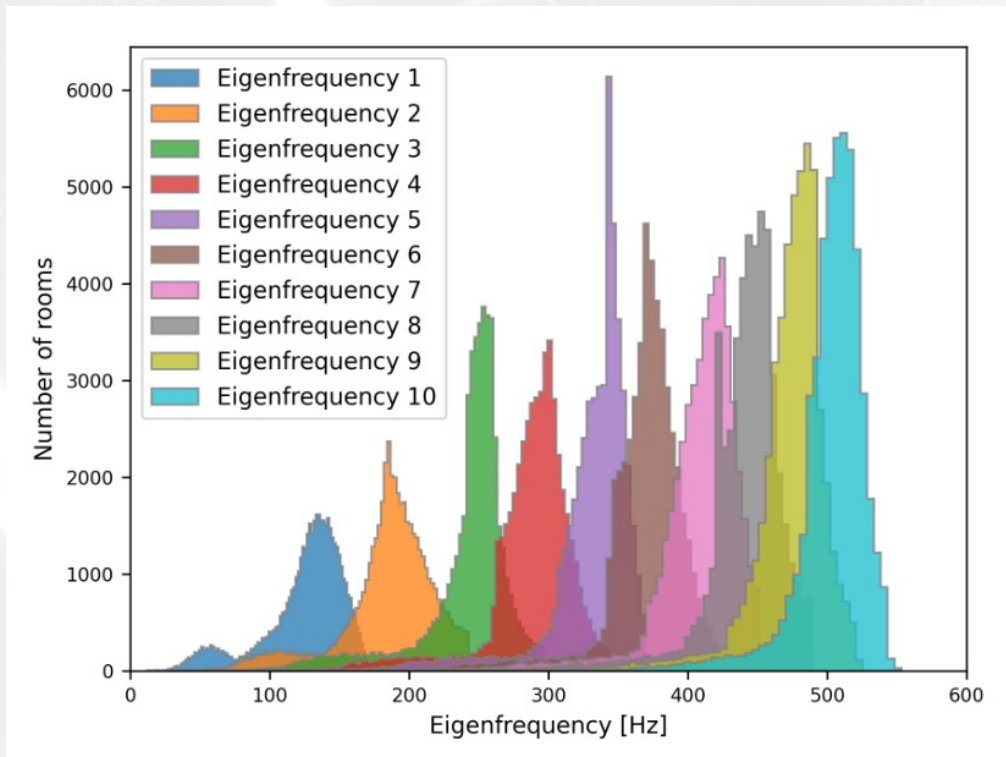
Residual neural network



SPL (dB)



II. Architectural acoustics



Lundin et al., *Prediction of eigenfrequencies in non-rectangular rooms with machine learning*, Int. Congress on Acoustics, Korea (2022)

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Thanks for your attention!



Acknowledgments: My students and collaborators

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Profile

