Otavio Colella Gomes

Room Acoustics Researcher & Consultant

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Profile

Room-acoustics researcher and consultant specialising in perceptual evaluation, auralisation, acoustic simulation and in-situ measurement, with more than five years of research and consultancy experience. Work spans ISO 3382 measurements and complete-room modelling, immersive listening experiments and custom analysis tools. Doctoral research investigates which aspects of early reflections, source directivity and simulation variability are perceptually important for realistic room-acoustic simulation.

Professional Experience

Acoustic Researcher / Consultant

Apr 2023 – Apr 2025

Kahle Acoustics · Brussels, Belgium

- Developed and optimised 3D acoustic models of performance venues and associated spaces from architectural plans and sections, primarily using Rhino and Grasshopper.
- Evaluated room geometry, volume and reflection coverage, developing Python components for project-specific Grasshopper workflows.
- Conducted room-acoustic simulations in CATT-Acoustic to assess reverberation time and other acoustic parameters and verify proposed design solutions.
- Developed 2D boundary-element models in MATLAB to evaluate bespoke acoustic elements, including reflector geometries.
- Conducted and analysed room impulse response (RIR) and spatial room impulse response (SRIR) measurements, while developing and improving MATLAB-based measurement and analysis tools for project-specific acoustic problems.
- Worked directly with clients, acoustic consultants, architects and project managers to identify acoustic requirements and develop solutions for performance venues and adjoining spaces.
- Conducted applied research into acoustic design solutions and internal methodologies using simulation, measurement and custom analysis tools.

Early-Stage Researcher

Sep 2019 – Feb 2023

Müller-BBM · Planegg, Germany

Marie Skłodowska-Curie doctoral researcher within the VRACE Innovative Training Network

- Conducted room impulse response measurements according to ISO 3382 and spatial room impulse response measurements for research and consultancy projects, using IRIS, M|Venue, MATLAB and DAW-based systems.
- Developed and optimised 3D room models in Rhino and Grasshopper and conducted simulations in CATT-Acoustic, ODEON and EASE for research and consultancy applications.
- Investigated the influence of simulation settings, including reflection order and ray count, and evaluated room geometries against project-specific acoustic requirements.
- Designed, implemented, conducted and statistically analysed bespoke listening experiments using binaural and multi-loudspeaker reproduction, including the development of custom MATLAB interfaces.
- Produced immersive auralisations using binaural reproduction, Ambisonics, spatial decomposition method processing and virtual-reality environments.
- Conducted source-directivity measurements, validated directivity-based simulation approaches against measured data and converted measured datasets into EASE, OpenDAFF and ODEON formats.
- Led the anechoic recording, editing and publication of an open-access multichannel string-quartet dataset, published through Zenodo alongside the I3DA conference paper.
- Completed research secondments and collaborations with international laboratories, including the University of Music and Performing Arts Vienna and Aalto University.
- Disseminated research through peer-reviewed journal articles, conference papers, international presentations and in-house events.

Risk Manager
Mar 2019 – Aug 2019

RECRUITERS (September Consulting Limited) – Microsoft Account · Dublin, Ireland

Consulting assignment for Microsoft

- Assessed commercial and operational risk in high-risk Microsoft transactions using information from multiple data sources.
- Maintained case records and produced reports for operational and team-performance analysis.

Education

Doctoral Candidate in Room Acoustics, Hochschule für Musik Detmold, Erich-Thienhaus-Institut — 2019 – expected 2026
Thesis: Perceptual Realism in Room Acoustic Simulations: Early Reflections, Source Directivity, and Simulation Variability

MPhil in Music and Media Technology, Trinity College Dublin — 2016 – 2018
Graduated with Distinction. Thesis: Room Acoustics Simulator: An Evaluation on Perceptual Acoustic Phenomena

Bachelor of Music, Faculdade Mozarteum de São Paulo — 2007 – 2010
Principal instrument: Violin

Technical Expertise

Room-acoustic measurement
RIR and SRIR acquisition and analysis; ISO 3382-1 measurements; IRIS, M|Venue, MATLAB and DAW-based measurement systems.

Acoustic simulation
CATT-Acoustic, ODEON, EASE, RAVEN and Treble; geometrical-acoustics modelling, model optimisation and validation; 2D boundary-element modelling.

Source directivity
Measurement, processing and validation of source-directivity data; conversion to EASE, OpenDAFF and ODEON formats.

3D modelling
Rhino and Grasshopper; construction and optimisation of simulation models from architectural drawings; geometric, volumetric and reflection-coverage analysis; basic Python scripting within Grasshopper.

Programming and analysis
MATLAB development for measurement, signal processing, acoustic analysis, experimental interfaces, statistical analysis and data visualisation; basic familiarity with Python, C/C++, JUCE and Max/MSP.

Perceptual evaluation
Design, implementation and statistical analysis of listening experiments; psychometric methods, paired comparisons, discrimination, plausibility and multi-stimulus evaluation.

Spatial audio and auralisation
Binaural reproduction, Ambisonics, spatial decomposition method (SDM), multi-loudspeaker reproduction and virtual-reality audio; REAPER.

Languages

Portuguese (native) · **English** (fluent) · **German** (fluent) · **Spanish** (basic)

Journal Articles

J. Thilakan, B. T. Balamurali, **O. Colella Gomes**, J.-M. Chen, and M. Kob, "**Exploring the Role of Room Acoustic Environments in the Perception of Musical Blending**," *The Journal of the Acoustical Society of America*, vol. 157, no. 2, pp. 738–754, 2025. doi:10.1121/10.0035563.

W. Lachenmayr, N. Meyer-Kahlen, **O. Colella Gomes**, A. Kuusinen, and T. Lokki, "**Chamber Music Hall Acoustics: Measurements and Perceptual Differences**," *The Journal of the Acoustical Society of America*, vol. 154, no. 1, pp. 388–400, 2023. doi:10.1121/10.0020066.

J. Thilakan, **O. Colella Gomes**, E. Mommertz, and M. Kob, "**Pilot Study on the Perceptual Quality of Close-Mic Recordings in Auralization of a String Ensemble**," *Proceedings of Meetings on Acoustics*, vol. 49, no. 1, article 035020, 2023. doi:10.1121/2.0001686.

Conference Papers

O. Colella Gomes, N. Meyer-Kahlen, W. Lachenmayr, and T. Lokki, "**Plausibility of Sound-Source Directivity Resynthesis in a Contemporary Edison Test**," in *Proceedings of the 12th Convention of the European Acoustics Association (Forum Acusticum 2026)*, Graz, Austria, 8–12 September 2026. Full paper.

O. Colella Gomes, J. Thilakan, and M. Kob, "**Towards an In-Situ Perceptual Experiment in Early Reflection Levels in a Concert Hall**," in *Proceedings of the 12th Convention of the European Acoustics Association (Forum Acusticum 2026)*, Graz, Austria, 8–12 September 2026. Full paper.

O. Colella Gomes and N. Peters, "**Simulation-Based Prediction of RIR Measurement Locations**," in *Proceedings of the 12th Convention of the European Acoustics Association (Forum Acusticum 2026)*, Graz, Austria, 8–12 September 2026. Full paper.

W. Lachenmayr, **O. Colella Gomes**, and T. Lokki, "**Publikumssimulation in einem Kammermusiksaal und Raumakustikmessung: Echtes Publikum vs. stoffüberhangene Bestuhlung**," in *Fortschritte der Akustik – DAGA 2026*, pp. 1238–1241, Dresden, Germany, 2026. doi:10.71568/daga2026.380.

O. Colella Gomes, J. Thilakan, and M. Kob, "**A Dodecahedron Inside a Room Acoustic Simulation: Are the Results Compatible With the Typical Ideal Omnidirectional Source?**," *INTER-NOISE and NOISE-CON Congress and Conference Proceedings*, vol. 272, no. 2, pp. 2893–2904, 2025. doi:10.3397/IN_2025_1076868.

E. Green, **O. Colella Gomes**, J. Kriz, V. Berrier, T. Wulfrank, and E. Kahle, "**The Influence of Reflection Surface Size in Concert Halls**," in *Proceedings of the Institute of Acoustics*, vol. 45, pt. 2, 11th International Conference on Auditorium Acoustics, Athens, Greece, 2023. doi:10.25144/16028. Full paper.

O. Colella Gomes, N. Meyer-Kahlen, W. Lachenmayr, and T. Lokki, "**Perceptual Consequences of Direction and Level of Early Reflections in a Chamber Music Hall**," in *Fortschritte der Akustik – DAGA 2022*, pp. 138–141, Stuttgart, Germany, 2022. Full paper.

O. Colella Gomes, W. Lachenmayr, J. Thilakan, and M. Kob, "**Anechoic Multi-Channel Recordings of Individual String Quartet Musicians**," in *2021 Immersive and 3D Audio: From Architecture to Automotive (I3DA)*, pp. 1–7, 2021. doi:10.1109/I3DA48870.2021.9610912.

O. Colella Gomes, W. Lachenmayr, and E. Mommertz, "**Raked, Flat, Angled or Horizontal – A Room Acoustical Investigation on Primary Shapes of Simplified Halls**," in *Fortschritte der Akustik – DAGA 2021*, pp. 1147–1150, Vienna, Austria, 2021. Full paper.

J. Thilakan, **O. Colella Gomes**, and M. Kob, "**The Influence of Room Acoustic Parameters on the Impression of Orchestral Blending**," in *Proceedings of Euronoise 2021*, Madeira, Portugal, 2021. Full paper.

O. Colella Gomes, W. Lachenmayr, and E. Mommertz, "**Spatial Energy Analysis for Room Acoustical Evaluation**," in *Fortschritte der Akustik – DAGA 2020*, pp. 834–837, Hannover, Germany, 2020. Full paper.

Research Datasets

O. Colella Gomes, W. Lachenmayr, J. Thilakan, and M. Kob, "**Anechoic Multi-Channel Recordings of Individual String Quartet Musicians**," Zenodo, 2021. doi:10.5281/zenodo.4955282.