

CURRICULUM VITAE

Toni Mateos

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Current CV version: Feb 2020

RÉSUMÉ

Co-creator of Dolby Atmos. Currently principal founder & CTO at Freeverse.io.

Previously at Dolby, I was Research Director at the Advanced Technology Group, where we had the pleasure of working at all timescales: supporting products already out there, figuring out new technologies (or twists of existing ones) that may have an impact in some years time, and working in small teams to prototype them.

Formerly co-founder and R&D Director of ImmSound (tech startup, 3D sound for cinema), which Dolby acquired in 2012.

Previous to these exciting events, I spent the first half of my professional life in String Theory and Quantum Gravity, and the second half doing research in Audio, mostly, in novel 3D sound technologies that are, first through Imm Sound, and now through Dolby, already changing the way we enjoy sound in cinemas, and in the media industry in general.

So this is how I got here:

Degree in Theoretical Physics → PhD in String Theory → Postdoc at Imperial College London
→ Postdoc Spatial Audio at Barcelona Media (BM) → Director of Audio Group at BM →
Co-founder of Imm Sound, R&D Director → Dolby Laboratories via acquisition of Imm Sound.

The boring statistics: 20+ years of experience in research; 20+ patents in spatial audio and audio processing; 30+ papers, 300+ citations; 15+ years teaching at various universities.

I absolutely love and respect computers, and believe that (great) coding and developing is one of the nicest mixtures of science, art, and social governance. A fan of Linux and the open source culture.

PRESENT POSITION

- **CTO** and principal founder at Freeverse.io

PREVIOUSLY

- **Director of Research**, Advanced Technology Group, at Dolby Laboratories, 2012-2019.
- **Co-founder and R&D Director** at Imm Sound, 2009-2012.
- **Scientific Director** of Audio Group at Barcelona Media Innovation Center, 2008-2012.
- **Associate Lecturer** at Dept. Technology, University Pompeu Fabra, 2006-2012.
- **PostGrad** in Blockchain Technologies, Polytechnic University of Barcelona, 2018.
- **Postdoc** in Acoustic Field Simulation and Audio Spatialization at Barcelona Media, 2006-2007.
- **Postdoc** in String Theory, and Quantum Field-Theory / Supergravity duality at the Imperial College of London, 2004-2006.

- **Doctor in Theoretical Physics**, University of Barcelona, 2004. Ph.D. Thesis on *D-branes, non-commutative theories and gauge/string duality* under the supervision of Professor Joaquim Gomis.
- **Degree in Physics** at the University of Barcelona, Spain (first class Honours), 1995-1999.

HUMAN LANGUAGES

Spanish and **Catalan** as native languages. Fluent spoken and written **English**. Good spoken and written **Modern Greek**. Fair understanding of **Italian** and **French**.

MACHINE LANGUAGES

Octave/Matlab, C/C++, Python, Javascript, Linux shell scripting. I've never had a formal developer role, but I've been coding side by side with some really great ones, and I've loved doing my best to learn from them.

EUROPEAN AND NATIONAL PROJECTS

IP-RACINE (IST-2-511316-IP), Integrated Project Research Area Cinema, 2006-2008. The project was devoted at improving the quality of European digital cinema industry, by creating a complete 'from scene to screen' workflow. Our contribution focused on developing new technologies for high quality audio postproduction in Digital Cinema; more specifically, we adapted room acoustics algorithms to automatize the reverb computation of a scene, given a position of the actors and the camera at every frame. A result of this technology was the new 'pre-listening' capability, that allowed the director to hear a real-time 5.1 version of some scenes at the shooting stage.

2020 3D Media (FP7-ICT-2007, 2008-2011) is a large IP European project devoted at improving the European industry related to 3D media, including capture, postproduction, distribution and exhibition. The BM Audio group participates both in the postproduction and the exhibition work-packages. The goal is twofold: to automatize and enhance the postproduction of 3D audio content, and to enhance the decoding to arbitrary 3D loudspeaker setups (with loudspeakers at different heights). **Responsible for BM's audio research.**

i3media (CENIT call, 2007-2010) is a large Spanish research project focused on the creation and automatization of intelligent audiovisual content. The audio group investigates and develops new technologies for the creation, postproduction and exhibition of audio content in an automatized way. **Responsible for BM's audio research.**

iMP (FP7, 2009-2011) is a STREPs European project aimed at creating architecture, workflow and applications for intelligent metadata-driven processing and distribution of digital movies and entertainment. The goal is to enable a Virtual Film Factory in which creative professionals can work together to create and customize programmes from Petabyte-scale digital repositories, using semantic technologies to organize data and drive its processing. **Responsible for BM's audio research.**

TCEyF (2000-2004, AEN1998-0431 and FPA2001-3598), aimed at the study of fundamental and effective quantum field theories of gravity and unification of all known basic interactions.

PUBLICATIONS

1. Breebaart, Jeroen; Cengarle, Giulio; Lu, Lie; Mateos, Toni; Purnhagen, Heiko; Tsingos, Nicolas, “Spatial Coding of Complex Object-Based Program Material”, *Journal of Audio Engineering Society*, Volume 67 Issue 7/8 pp. 486-497; 2019
2. G. Cengarle, T. Mateos, “Effect of microphone number and positioning on the average of frequency responses in cinema calibration”, *Audio Engineering Society Convention 136*, 2014. Awarded best peer-reviewed paper.
3. D. Arteaga, D. Garca, T. Mateos, J. Usher, “Scene Inference from Audio”, *Audio Engineering Society Convention 134*, 2013.
4. J. Escolano, C. Spa, A. Garriga, T. Mateos, “Removal of afterglow effects in 2-D discrete-time room acoustics simulations”, *Applied Acoustics*, Volume 74, Issue 6, pp. 818-822, June 2013.
5. G. Cengarle, T. Mateos, “A playback-system-independent clipping detector for multichannel audio production”, *AES 132nd Convention*, Hungary, April 2012.
6. G. Cengarle, T. Mateos, D. Bonsi, “A second order Ambisonic device using velocity transducers”, *JAES Volume 59 Issue 9* pp. 656-668; September 2011.
7. G. Cengarle, T. Mateos, “Comparison of anemometric probe and tetrahedral microphones for sound intensity measurements”, Presented at the 130th AES Convention, London, May 2011.
8. T. Mateos, J. Escolano, C. Spa, A. Garriga, “Compensation of the afterglow phenomenon in 2-D discrete-time simulation”, *IEEE Signal Processing Letters*, vol. 17, issue 8, p758-761, June 2010.
9. G. Cengarle, T. Mateos, N. Olaiz, P. Arumi, “A new technology for the assisted mixing of sport events: application to live football broadcasting”, Presented at the 128th AES Convention, London, May 2010.
10. D. Garcia, D. Arteaga, J. Usher, T. Mateos, “Determining a room geometry from its impulse response”, Presented at *Internoise*, Lisbon, June 2010.
11. P. Arumi, N. Olaiz, T. Mateos, “Remastering of movie soundtracks into immersive 3D audio”, *Blender Conference 2009*, Amsterdam.
12. Toni Mateos, “The arrival of 3D audio”, Keynote in the 6th European Conference on Visual Media Production (CVMP), London, November 2009.
13. G. Cengarle, T. Mateos and D. Bonsi. “Confronto sperimentale tra microfono B-format Soundfield e sonda intensimetrica di pressione e velocit Microflown”, 36th national meeting of the Italian Acoustic Association (AIA), Turin, June 2009.
14. C. Spa, T. Mateos, A. Garriga. “Methodology for studying the numerical speed of sound in finite differences schemes”, *Acta Acustica united with Acustica*, Volume 95, Number 4, July/August 2009, pp. 690-695.
15. Olaiz, N. Arumi, P. Mateos, T. Garcia, D. 2009. “3D-Audio with CLAM and Blender’s Game Engine” *Proceedings of the 7th International Linux Audio Conference (LAC09)*; April 2009; Parma, Italy.

16. Jaume Durany, Adan Garriga, Pau Arumi, Toni Mateos, “Sound spatialization using ray tracing”, Proc. of the EAA Symposium on Auralization, Espoo, Finland, 15-17 June 2009.
17. W. Bailer, P. Arumi, T. Mateos, A. Garriga, J. Durany, and D Garcia, “Estimating 3D Camera Motion for Rendering Audio in Virtual Scenes”, 5th European Conference on Visual Media Production, 2008.
18. Presentation and posters at *ASA Acoustics 2008*, Paris:
 - Pau Arumi, David Garcia, Toni Mateos, Adan Garriga, Jaume Durany, “Real-time 3D audio for digital cinema”, J Acoust Soc Am. 2008 May ;123 (5):3937 18532723.
 - Jaume Durany, Adan Garriga, Toni Mateos, “Towards a realistic ray tracing for room acoustics”, J Acoust Soc Am. 2008 May ;123 (5):3769 18532087.
 - Carlos Spa, Toni Mateos, Adan Garriga, “General impedance boundary conditions in pseudo-spectral time-domain methods for room acoustics”, J Acoust Soc Am. 2008 May ;123 (5):3760 18532057.
19. J. P. Gauntlett, O. Mac Conamhna, T. Mateos and D. Waldram, “AdS spacetimes in M-theory,” Fortsch. Phys. **55** (2007) 721.
20. J. P. Gauntlett, O. Mac Conamhna, T. Mateos and D. Waldram, “New supersymmetric AdS(3) solutions,” Phys. Rev. D **74**, 106007 (2006) [arXiv:hep-th/0608055].
21. J. P. Gauntlett, O. Mac Conamhna, T. Mateos and D. Waldram, “Supersymmetric AdS(3) solutions of type IIB supergravity,” Phys. Rev. Lett. **97**, 171601 (2006) [arXiv:hep-th/0606221].
22. J. P. Gauntlett, T. Mateos, O. Mac Conamhna and D. Waldram, “AdS spacetimes from wrapped M5 branes,” JHEP **0611**, 053 (2006) [arXiv:hep-th/0605146].
23. T. Mateos, “Continuous Families of Conformal Field Theories from String Theory,” Fortsch. Phys. **54** (2006) DOI 2005 10288.
24. T. Mateos, “Marginal deformation of N = 4 SYM and Penrose limits with continuous spectrum,” JHEP **0508** (2005) 026 [arXiv:hep-th/0505243].
25. J. P. Gauntlett, S. Lee, T. Mateos and D. Waldram, “Marginal deformations of field theories with AdS(4) duals,” JHEP **0508** (2005) 030 [arXiv:hep-th/0505207].
26. T. Mateos, “D-branes, gauge / string duality and noncommutative theories,” arXiv:hep-th/0409259.
27. T. Mateos, “Supersymmetry of tensionless rotating strings in AdS(5) x S**5,” Fortsch. Phys. **53** (2005) 943.
28. D. Mateos, T. Mateos and P. K. Townsend, “More on supersymmetric tensionless rotating strings in $AdS_5 \times S^5$,” Quantum Theory and Symmetries, Proceedings of the 3rd International Symposium (2003) [arXiv:hep-th/0401058].
29. D. Mateos, T. Mateos and P. K. Townsend, “Supersymmetry of tensionless rotating strings in $AdS_5 \times S^5$, and nearly-BPS operators,” JHEP **0312** (2003) 017 [arXiv:hep-th/0309114].
30. J. Gomis, T. Mateos, P. J. Silva and A. Van Proeyen, “Supertubes in reduced holonomy manifolds,” Class. Quant. Grav. **20** (2003) 3113 [arXiv:hep-th/0304210].

31. J. Bruges, J. Gomis, T. Mateos and T. Ramirez, “Commutative and noncommutative $N = 2$ SYM in 2+1 from wrapped D6-branes,” *Class. Quant. Grav.* **20** (2003) S441 [arXiv:hep-th/0212179].
32. T. Mateos, J. M. Pons and P. Talavera, “Supergravity dual of noncommutative $N = 1$ SYM,” *Nucl. Phys. B* **651** (2003) 291 [arXiv:hep-th/0209150].
33. J. Bruges, J. Gomis, T. Mateos and T. Ramirez, “Supergravity duals of noncommutative wrapped D6 branes and supersymmetry without supersymmetry,” *JHEP* **0210** (2002) 016 [arXiv:hep-th/0207091].
34. J. Gomis and T. Mateos, “D6 branes wrapping Kaehler four-cycles,” *Phys. Lett. B* **524** (2002) 170 [arXiv:hep-th/0108080].
35. T. Mateos and A. Moreno, “A note on unitarity of non-relativistic non-commutative theories,” *Phys. Rev. D* **64** (2001) 047703 [arXiv:hep-th/0104167].
36. J. Gomis, K. Kamimura and T. Mateos, “Gauge and BRST generators for space-time non-commutative $U(1)$ theory,” *JHEP* **0103** (2001) 010 [arXiv:hep-th/0009158].

SUPERVISION OF ACADEMICAL RESEARCH

PhD Thesis Supervisor:

- *3D Audio technologies: applications to sound capture, post-production and listener perception*, Dept. Information and Communication Technologies, UPF, by Giulio Cengarle, 2012.

PhD Thesis Tribunal Member:

- *Wavelet-based spatial audio framework; from Ambisonics to wavelets: a novel approach to spatial audio*, Dept. Information and Communication Technologies, UPF, by Davide Scaini, 2019.

PhD Thesis Tribunal Member:

- *Parametric array designs and exploitation methods for directivity control of audible sounds*, Department of Engineering, La Salle Ramon Llull University, by Umut Sayin, 2012.

Master Thesis Supervisor:

- *3D Audio effects for multi-channel reproduction*, Master of Sound and Music Computing, UPF, by Antonio Escamilla, 2009-2010.

Degree Final Projects Supervisor:

- *Musical applications of object-oriented 3D audio*, UPF, by Aleix Fabra Roca, 2008.
- *Tools for 3D audio post-production*, UPF, by Ferran Orriols Lpez, 2008.
- *Livecoreo, a graphical tool for 3D sound post-production*, UPF, by Angelo Scorza, 2011.

FELLOWSHIPS AND AWARDS

Best peer-reviewed paper at AES 136th convention, 2014

Torres y Quevedo 2 years fellowship, Spain, 2006-2008.

Particle Physics and Astronomy Research Council (UK) 2 years fellowship, from Oct-2004.

PhD Fellowship from the *Generalitat de Catalunya*(Catalan Government, Spain), Jan-99 to Dec-03.

Special Mention for undergraduate studies (*Premi extraordinari fi de carrera*) from the U. of Barcelona.

First of 1999 Physics promotion at the University of Barcelona.

TEACHING EXPERIENCE

- *Acoustics Engineering* at the Audiovisuals Faculty, University Pompeu Fabra, 2010-2012.
- *Foundations of Physics* at the Computer Science Faculty, University Pompeu Fabra, 2006-2011.
- *Experimental Physics* demonstrator, Imperial College, Jan-2006 to July-2006.
- Teaching assistant in *Programming in C++* at the Faculty of Physics, Imperial College of London, during the course 2005-2006.
- Teaching assistant in *Classical Electrodynamics* at the Faculty of Physics, University of Barcelona, during the course 2003-2004.
- Teaching assistant in *Mechanics Laboratory* at the Faculty of Physics, University of Barcelona, during the course 2003-2004.
- Teaching assistant in *Mathematical Analysis* at the Faculty of Physics, University of Barcelona, during the years 2001-2003.

RESEARCH STAYS

- European Laboratory for Particle Physics (CERN), Geneva, Switzerland, from July to September, 1999, as a Summer Student, performing data analysis at LEP2.
- *Henri Poincaré Institute*, of the *Université Pierre et Marie Curie*, Paris. 4 months stay (September to December, 2000), doing research on noncommutative field theories.
- Department of Applied Mathematics and Theoretical Physics, Cambridge University, UK, from February to March of 2003, under the supervision of Paul K. Townsend.
- Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada, whole of May 2004.