21, RUE SAINTE-MARGUERITE - 93500 PANTIN - FRANCE
TEL.: +33-7-83376573, +39-347-6707190 • E-MAIL: CARMINE.EMANUELE.CELLA@GMAIL.COM
• WEB: WWW.CARMINECELLA.COM

CARMINE-EMANUELE CELLA

Ph.D. - composer, researcher

AT A GLANCE

- renown composer at international level
- senior researcher in applied mathematics on music and acoustic signals in prestigious institutions (Ircam, Ecole Normale Superieure, etc.)
- conservatory master degrees in piano, computer music, composition
- master degree in mathematical logic (minor in philosophy)
- PhD in composition
- PhD in applied mathematics
- nominated member of Academie de France in Madrid
- nominated fellow of American Academy in Rome
- recipient of prestigious Petrassi prize for composition from president of Italian Republic
- extensive teaching experience (composition, signal processing, linear algebra, etc.)
- author of numerous research papers
- author of several softwares largely used in the audio community
- reviewer in international journals and conference
- experience with industry bodies, co-founder of startups
- current positions:
  - associate professor in computer music, Conservatory of music "G. Rossini" - Pesaro
  - adjoint researcher at Ircam - Paris / HEM - Geneve

EDUCATION

Ph.D. *with excellence* in **Science, cognition and technology (applied mathematics)**
Dissertation title: *On symbolic representation of music*
University of Bologna, Italy, 2011

Ph.D. (10/10) in **Composition**
Accademia Nazionale "S. Cecilia" – Rome, Italy, 2007

Master *cum laude* in **Mathematical logic** (minor in philosophy)
Dissertation title: *Sulla struttura logica della musica*
University of Urbino, Italy, 2004

Master in **Composition**
Conservatory of Music – Pesaro, Italy, 2003

Master (10/10) in **Computer Music**
Conservatory of Music – Pesaro, Italy, 2001

Master in **Piano**
Conservatory of Music – Pesaro, Italy, 1998

Internships

Jul – Sep 2010: visiting student, McGill University – Montreal. Supervisor: Prof. Ichiro Fujinaga

Oct – Dec 2009: visiting student, Ircam - Paris. Supervisor: Prof. Moreno Andreatta

SCIENTIFIC CAREER

Main research interests

- Machine learning (mathematical models of deep learning)
- Music information retrieval (audio indexing and classification, symbolic representation of acoustic signals, logical structure of music)
- Physical modelling

Positions

2017 - 2018 : adjoint researcher at Ircam in Paris / HEM in Geneve. Research topics: machine learning models for automatic orchestration.

2015 - 2016: post-doc at Ecole Normale Superieure in Paris, in the DATA team with Stéphane Mallat. Research topics: mathematical modelling of deep learning.

2013 – 2014: head of technical research in the startup company Mogees in London. Co-author of a pending patent on algorithms for physical modelling.

2012: invited researcher at Goldsmith university, in London. Research topics: human-computer interactions.

2011 – 2013: composer in research at Ircam in Paris. Research topics: extensions of the theory of sound-types.

2009 – 2011: PhD student position at University of Bologna. Research topics: symbolic representations of music and audio signals.

2009: co-founder of the startup 31tone, in Amsterdam, for production of software for musical creation on the iOS platform.

2007 – 2008: Research and development position in the context of the *Sample Orchestrator* and *Ecoute* european projects at Ircam, in Paris. Research topics: audio indexing and classification.

2006: Research and development position for Viscount International Spa. Research topics: creation of a remote control system for physical modelling synthesis, with ad-hoc GUI creation by user with a proprietary scripting language called *IdiL*.

2006: founder of startup Cryptosound, in Italy, for production of software for audio

2004 – 2005: Research and development position for Viscount International Spa. Research topics: creation of a vocal harmonizer with formant preservation and intelligent voicing.

2001 – 2003: Research and development position for Viscount International Spa. Research topics: software simulation of a proprietary DSP processor called *Age++*.

Publications

Book chapters

Nuovi approcci alla struttura armonica: caleidocicli e mosaici tricordali
In "Caleidocicli musicali" by Luigi Verdi - 2nd edition, 2010 Milano, Rugginenti

P*apers*

An Unsupervised Neural Network Architecture for Timbre Transfer in the Frequency Domain
(with L. Gabrielli, F. Vesperini, D. Droghini, E. Principi and S. Squartini),
Journal of MDPI Applied science (under review), 2017.

Machine listening intelligence
International Workshop on Deep learning for music, 2017, Anchorage, ALASKA.

Deep convolutional networks on the pitch spiral for musical instrument recognition
(with V. Lostanlen), ISMIR 2016, New York, USA.

Vuza: a functional language for creative applications, ICMC 2014, Athens, Greece.

Advanced sound hybridizations by means of the theory of sound-types
(with J.J. Burred), ICMC 2013, Perth, Australia.

Sound-types: a new framework for symbolic sound analysis and synthesis
ICMC, Huddersfield, United Kingdom, 2011.

Harmonic Components Extraction in Recorded Piano Tone
128th AES conference London, United Kingdom, 2010.

Towards a Symbolic Approach to Sound Analysis
Second international conference on Mathematics and computation for music
Yale University, New Haven , CT, 2009, Springer.

Using the SDIF Sound Description Interchange Format for Audio Features
(with J.J. Burred, G. Peeters, A. Röbel and D. Schwarz) Proc. International Conference on Music Information Retrieval (ISMIR), Philadelphia, USA, September 2008.

Review of "Caleidocicli musicali" by Luigi Verdi
Musica theorica Spectrum, Fall 2006, Ed. Curci Milano (Italy)

Il compositore cieco
Rivista umbra di musicologia, n. 50 – 2006/1, pagg. 17 – 27 Perugia (Italy)

Il semplice sistema
Rivista umbra di musicologia, n. 49 – 2005/2, pagg. 43 – 51 Perugia (Italy)

Sulla struttura logica della musica
(On the logical structure of music) Rivista umbra di musicologia, n. 48 – 2005/1, pagg. 3 – 57, Perugia (Italy)

Sintesi per stati e visualizzazione del processo compositivo
(written with F. Paolinelli) La Terra Fertile, Proceedings, 2000, pagg. 87 – 89 L'Aquila (Italy)

Referee in international journals or conferences

- EURASIP Journal of Audio Signal Processing (JASP)
- Colloquio di informatica musicale (CIM)
- Ircam musical research residency program
- Mathematics and computation in music (MCM)
- International society for music information retrieval (ISMIR)
- IEEE Transactions on Emerging Topics in Computational Intelligence

Services to the community

Creator and organiser of the international round-tables *Re.M.I.X (recherche musicale ircamienne et crosiée)* on musical research. The first meeting has taken place in October 2017 in Paris and had more than 50 participants from all over the world.

Softwares (selection)

- *Ircamdescriptor (co-author) (http://anasynth.ircam.fr/home/english/software/ircamdescriptor-c-lib-exe)*: computation of low-level descriptors on audio signals
- *Orchids (co-author) (http://forumnet.ircam.fr/user-groups/orchids/forum/topic/installation-and-database-sol/)*: automatic orchestration
- *Sonic-pad (http://www.sonic-pad.com):* advanced spectral processing for audio signals
- *Sparkle (https://itunes.apple.com/ca/app/sparkle-advanced-cross-synthesis/id818477094?mt=8):* advanced cross-synthesis for iOS devices
- *Vuza (http://www.vuza.org)*: functional programming language for creative applications

MUSICAL CAREER

Prizes

- 1st prize at the **G. Rossini** composition competition (1998)
- semifinalist at the **Queen Elisabeth** composition competition (2006)
- semifinalist at the **George Enescu** composition competition (2007)
- recipient of the prestigious **Petrassi prize** for composition, from the **President of the Italian Republic** Giorgio Napolitano (2008)
- selected by the **SWR** orchestra of Stuttgart (2009)
- 1st prize at the **Egidio Carella** competition (2010)
- 2nd prize at the **ICOMS** composition competition (2010)
- finalist at the international **Isang Yun** music prize in South Korea (2011)
- recipient the prestigious **A. Rubinstein prize** from Teatro La Fenice in Venice (2014)

Grants

- **Emma Contestabile** grant from Accademia Chigiana (2007)
- **Giovanni Guarino** grant from Accademia di S. Cecilia in Rome (2007)
- nominated member of **Academie de France à Madrid** at Casa de Velazquez (2013-2014)
- Italian Fellow in composition at the **American Academy in Rome** (2016)

Performances

His music has been performed in several countries (Italy, France, Germany, Ireland, United States, Canada, South Korea, ...) from musicians like Mathias Pintscher, Gianluigi Trovesi, Jukka-Pekka Saraste and many others. He had commissions from Orchestre Philarmonique de Radio France, Ircam, Les percussions de Strasbourg, Orchestra Filarmonica delle Marche, Orchestra Regionale della Toscana, Ensemble orchestral de Lyon, Uhko ensemble in Kiev, etc. He writes mainly for orchestra and his music is published by **Edizioni Suvini Zerboni** - SugarMusic S.p.A., Milan.

Selected works

Pane, sale sabbia, chamber opera for large ensemble, four singers and electronics, commande Ukho ensemble/Kiev National Opera, conductor: Luigi Gaggero, Kiev, june 2017

Inside-out for smart percussions, commande Ircam, 104 Paris, Les Percussions de Strasbourg, Paris, june 2017

All of a sudden for orchestra, commande Teatro Verdi, conductor: Marco Angius, ORT, Florence, September 2014

Les reflets de l'ombre, for large orchestra and electronics, commande Ircam – Radio France, Salle Pleyel, conductor: Jukka-Pekka Saraste, Paris, june 2013

Ali oscillano in fioco cielo, madrigal for five voices, may 2013, Italy, Venice, Festival Pas-E, La Dolce Maniera, conductor: Luigi Gaggero

Gia' s'ottenebra il giorno, for orchestra, commande Ircam, Paris, Centre Pompidou, june 2012, Orchestre philharmonique de Radio France

Improvviso statico, for saxophone and electronics, Rome, Conservatorio S. Cecilia, EmuFest, par Enzo Filippetti, 2012

Lì Mădòu - Il vento dell'amicizia, for orchestra, voice and electroncis, commande FORM (Fondazione Orchestra Regionale delle Marche), 2010

The Manhattan distance, for orchestra, Séoul, 2011

La fin du jour, Stuttgart, Orchestre de la SWR Stuttgart, conductor : Matthias Pintscher

Performances as pianist

From 2000 to 2005 Carmine has been *repetiteur* at major lyrical institutions: Rossini Opera Festival (Italy), the Wexford Festival Opera (Ireland), Teatro Comunale of Bologna (Italy), Teatro Rossini of Lugo (Italy). He played in recital with the famous soprano Mariella Devia and had some collaborations with Luciano Pavarotti.

Carmine-Emanuele Cella, moreover, played jazz with his quartet for more than ten years, collaborating with many important Italian musicians.

TEACHING

Since 2006 he has been teaching in several conservatories, universities and research institutes (conservatories of Pesaro, Rome, Vicenza, Castelfranco, Avellino and Paris - CNSM; universities of Bologna, Ircam, etc.). The principal topics for his classes are: harmony, musical composition, signal processing, musical acoustics, mathematics for DSP, computer programming for audio (C++, Python, Matlab) and live electronics. He also gave many lectures on different topics related to his research in many universities both in Italy and abroad.

Habilitations for teaching at university

Italy: musical informatics, legge 128/13 AFAM
France: computer science/informatics MCF 27, qualification number 17227305231

Principal positions (selection)

2014-now: associate professor in computer music, Conservatory of music "G. Rossini" - Pesaro, department of music and new technologies

2012-2014: lecturer in computer music, Conservatory of music "A. Pedrollo" - Vicenza, department of music and new technologies

2013: adjunct lecturer in signal processing, Ircam - Paris, ATIAM master program

2012: lecturer in mathematical methods for signal processing, Conservatory of music "S. Cecilia" - Rome, department of music and new technologies

2011: lecturer in harmony, analysis and composition, Conservatory of music "D. Cimarosa" - Avellino, department of composition

2009-2011: adjunct lecturer in mathematical logic, University of Bologna, joint doctoral program between departments of computer science, philosophy and psychology

2006: adjunct lecturer in philosophy, scientific high school "G. Marconi", Pesaro

Syllabi (selection)

Elements of mathematics for signal processing - 42 hours

- Elements of linear algebra: vector spaces and linear combinations, basis, Banach and Hilbert spaces, projections and reconstructions, algebraic interpretation of analysis and synthesis, different bases (wavelets), introduction to convolution

- Fourier's theory: polynomial interpretation of harmonic series, elements of trigonometry, exponential functions, complex numbers, Euler's identity, Fourier series, Fourier transform

Digital signal processing for music- two modules of 42 hours each

- Introduction to digital signals: conversion AD (sampling and quantisation), Nyquist's theorem, linear time-invariant systems (LTI)

- Additive synthesis: history and theory, implementation in Max/MSP using high-level control strategies

- Introduction to digital filters: IIR and FIR types, introduction to filter design, implementation in Max/MSP using GEN of principal audio filters

- Subtractive synthesis: history and theory, implementation in Max/MSP using high-level control strategies, comparison with additive synthesis

- Modulation synthesis: introduction to RM and AM, introduction to FM and mathematical interpretation (Bessel functions)

- Granular synthesis: introduction to Gabor's theory of sound, taxonomy and implementation in Max/MSP of principal typologies

- Spectral processing: introduction to phase vocoder and implementation in Max/MSP, implementation of specific effects (spectral freeze, spectral delay, cross-synthesis)

- Introduction to physical modelling: Karplus-Strong, waveguides, modal synthesis

- Source-filter models: introduction to human voice, formant synthesis, LPC filter

- Low-level descriptors: general theory and implementation in Max/MSP (spectral centroid, spectral spread, spectral kurtosis, spectral skewness, spectral flux, spectral irregularity, harmonicity, MFCC and perceptual descriptors, etc.)

Musical acoustics - 60 hours

- Waves and oscillations, variation of air pressure, propagation
- Periodic and aperiodic phenomena, harmonics and partials, elementary waveforms
- Measure of amplitude, power, intensity and acoustic pressure, dB
- Introduction to timbre: classical and modern theory, fusion and timbre perception, spectral envelope and its transposition
- Perception of sound direction, wave front, Haas effect, binaural delay, head-related transfer functions, reflection, refraction and diffraction, interferences, Doppler effect

Talks (selection)

Logical foundation of music
Mamux, Ircam, Paris, 2006

Logica, suono, musica
University of Pisa, department of mathematics, 2008

A symbolic approach to sound analysis: type theories and abstraction levels
Ircam, Paris, 2009

Introductory notes on Geometry of Interactions
Ircam, Paris, 2009

A survey on Geometry of Interactions
University of Bologna, department of computer science, 2010

A symbolic approach to sound analysis
McGill university, Montreal, Canada, 2010

On symbolic representations and transformations of sound
IRMA (Institut de Recherche Mathématique avancée), Strasbourg, 2011

On symbolic representations of sound: the theory of sound-types
Queen Mary university, London, 2011

On the geometric interpretation of musical signals
ATIAM, Ircam, Paris, 2012

On symbolic representations of sound: the theory of sound-types
University "Tor Vergata", Rome, 2012

Logical representations of music
Bibliothèque universitaire de Lyon, 2015

From signal representations to musical creation
Mamux, Ircam, Paris, 2015

On symbolic representation of music
École normale supérieure , Paris, 2015

A composer's perspective on Music Information Retrieval
Leibniz-Zentrum für Informatik, Daghstul, Germany, 2016

From signal representations to musical creation: a geometric approach
Institute of Mathematics - National Academy of Sciences of Ukraine, Kiev, 2017

GENERAL INFORMATIONS

Personal data

Place of birth: Urbino (PU), Italy
Date of birth: 4/5/1976
Citizenship: Italian
Address: 21, rue Sainte-Marguerite, 93500 Pantin, France
Email: carmine.emanuele.cella@gmail.com, cella@ircam.fr, cella@ens.fr
Web: http://www.carminecella.com

Languages

Italian: native speaker
English: excellent knowledge
French: excellent knowledge
Spanish: basic knowledge

Hobbies

Private pilot training for propeller aircrafts (EASA)