



The Center for New Music & Audio Technologies
Genevieve McEnerney Hall, 1750 Arch St, Berkeley, CA 94709
www.cnmat.berkeley.edu

CNMAT is dedicated to multidisciplinary research and the creative use of sound, linking the concert hall to the laboratory. We support a dynamic group of educational, performance and research programs focused on the creative interaction between new music and emerging technologies. CNMAT partners with the Department of Music and further collaborates with a number of affiliate departments, presenters, centers, and units on campus, including the Department of Art Practice, the Department of Theater, Dance, and Performance Studies, the Department of Film and Media, the Jacobs Institute for Design Innovation, the College of Environmental Design, the Arts Research Center, the Townsend Center for the Humanities, the Berkeley Institute of Design, the Berkeley Center for New Media, BAM/PFA, Cal Performances, and the Magnes Collection of Jewish Art and Life.

FACULTY & STAFF

Director: Prof. Edmund Campion, Department of Music
Lead Researcher: Asst. Prof. Carmine-Emanuele Cella, Department of Music
Technical Director: Jeremy Wagner, PhD
Acting Associate Director: Jeremy Hunt, PhD

CNMAT GRADUATE USERS GROUP (CUG) OFFICERS

President: Curtis Rumrill
Vice President: Danniell Ribeiro
Grant Writer: Andrew Harlan
Publicity: Hallie Smith
GA Liason: Kevin Lo

LECTURES, WORKSHOPS, SEMINARS, DEMONSTRATIONS

[†] CNMAT USERS GROUP. Organized by students at CNMAT with support from the CNMAT staff and matching resources from CNMAT and student grants
[∞] CNMAT DEI (Diversity, Equity, Inclusion). Initiative to promote and present underrepresented groups and individuals involved in creative computing and music
[§] CNMAT/MUSIC DEPT. Organized and presented in collaboration with the Department of Music and/or other CNMAT Affiliates

2021-09-17 | *CNMAT Open Lab: Review and Presentation of Student and Faculty Projects*

[∞] 2021-10-15 | *Composition, Performance, and Improvisation with Technology*
Minh-Tâm Nguyen, Soloist & Artistic Director of Percussions de Strasbourg
<https://cnmat.berkeley.edu/events/online-colloquium-tâm-nguyen-percussions-de-strasbourg>

2021-10-22 | *Gesture and Electronics in My Creative Practice*
Hans Tuschku, Director of the Electroacoustic Studios at Harvard University
<https://cnmat.berkeley.edu/events/colloquium-hans-tutschku-harvard-university>

2021-11-05 | *My Creative Practice*
Mark Applebaum, Edith & Leland Smith Professor of Composition at Stanford University
<https://cnmat.berkeley.edu/events/colloquium-mark-applebaum>

^{†∞} 2021-11-18 | *CNMAT Users Group (CUG): Mixing & Mastering Live Music Recordings*
Murat Colak, Faculty, Music Technology at Montclair State University

2021-09-17 | *CNMAT Open Lab: Review and Presentation of Student and Faculty Projects*



2021-12-09 | *Light Wall System*

Jean Geoffroy, Professor of Music at Conservatoire National Supérieur de Musique et de Danse de Lyon

<https://cnmat.berkeley.edu/news/jean-geoffroy-lecture---light-wall-system>

2022-03-28 | *Virtual Reality & Immersive Sound*

Tim Summers, Artistic Director of the VR/Immersive Sound Project for the Mahler Chamber Orchestra, Berlin

2022-05-13 | *Quarter-tone Clarinet*

Gregory Oakes, Faculty of Iowa State University

<https://cnmat.berkeley.edu/events/gregory-oakes-concertlecture>

CNMAT CONCERTS AND PERFORMANCES

† CNMAT USERS GROUP. Organized by students at CNMAT with support from the CNMAT staff and matching resources from CNMAT and student grants

∞ CNMAT DEI (Diversity, Equity, Inclusion). Initiative to promote and present underrepresented groups and individuals involved in creative computing and music

§ CNMAT/MUSIC DEPT. Organized and presented in collaboration with the Department of Music and/or other CNMAT Affiliates

2021-10-22 | *Hans Tuschku in Concert*

<https://cnmat.berkeley.edu/events/concert-hans-tuschku>

2021-11-05 | *Mark Applebaum in Concert*

<https://cnmat.berkeley.edu/events/concert-mark-applebaum>

† 2021-11-13 | *Ear Foil: Hallie Smith, Eda Er, Danielle DeGruttola*

<https://cnmat.berkeley.edu/events/concert-ear-foil>

2021-11-17 | *Rafal Zapala & Hashtag Ensemble*

<https://cnmat.berkeley.edu/events/concert-rafal-zapala-hashtag-ensemble>

†∞ 2021-12-02 | *Kevin Lo, Hallie Smith, Ava Koohbor*

<https://cnmat.berkeley.edu/events/concert-kevin-lo-ava-koohbor-hallie-smith>

†∞ 2021-12-11 | *Janice Isabel Jackson California Residency Concert*

<https://cnmat.berkeley.edu/events/janice-isabel-jackson-california-residency-concert>

∞ 2021-12-19 | *SFCMP Sound Encounters II*

<https://cnmat.berkeley.edu/events/concert-sound-encounters-ii-sfcmncmat>

2022-01-22 | *Jared Redmond & Richard Dudas* [POSTPONED due to Covid]

<https://cnmat.berkeley.edu/events/concert-jared-redmond-and-richard-dudas>

†∞§ 2022-02-18 | *Berkeley New Music Project & ECO Ensemble*

<https://cnmat.berkeley.edu/events/berkeley-new-music-project-eco-ensemble>

†∞ 2022-02-26 | *Andrew Blanton, Eda Er, Hallie Smith*

<https://cnmat.berkeley.edu/events/cug-presents-blanton-er-smith>

∞§ 2022-03-14 | *Viola Yip & Laetitia Sonami*

<https://cnmat.berkeley.edu/events/viola-yip-laetitia-sonami>

†§ 2022-03-18 | *Splinter Reeds*

<https://cnmat.berkeley.edu/events/splinter-reeds>

∞ 2022-04-06 | *Januibe Tejera, Alice Belugou, Olivier Stankiewicz*

<https://cnmat.berkeley.edu/events/tejera-belugou-stankiewicz-concert>



- ∞ 2022-04-15 | CCRMA at CNMAT: Engin Dağlık, Barbara Nearnness
<https://cnmat.berkeley.edu/events/ccrma-cnmat-concert>

- 2022-04-22 | Word Search: Pop-up Installation
<https://cnmat.berkeley.edu/events/pop-exhibition-word-search>

- †∞ 2022-04-30 | Rage Thormbones
<https://cnmat.berkeley.edu/events/rage-thormbones>

- † 2022-05-03 | Heliosongs: Music 158b Student Showcase

- § 2022-05-09 | Berkeley New Music Project & ECO Ensemble Recording Session

- †∞ 2022-05-11 | Installation: Resonant, Dwelling, Unfading
<https://cnmat.berkeley.edu/events/installation-resonant-dwelling-unfading>

- 2022-05-13 | Gregory Oakes in Concert
<https://cnmat.berkeley.edu/events/gregory-oakes-concertlecture>

VISITING SCHOLARS & RESEARCHERS

- † CNMAT USERS GROUP. Organized by students at CNMAT with support from the CNMAT staff and matching resources from CNMAT and student grants
- ∞ CNMAT DEI (Diversity, Equity, Inclusion). Initiative to promote and present underrepresented groups and individuals involved in creative computing and music
- § CNMAT/MUSIC DEPT. Organized and presented in collaboration with the Department of Music and/or other CNMAT Affiliates

Alessandro Frullani — Italy

<https://cnmat.berkeley.edu/news/alessandro-frullani-works-professor-cella-instrument-augmentation>

Alessandro worked in collaboration with Prof. Carmine-Emanuele Cella to implement a sensor system for the augmented mbira project.

Eduardo Miranda — Italy [POSTPONED due to Covid]

∞ Hélène Papadopoulos — France

Hélène worked with Prof. Carmine-Emanuele Cella in the application of machine learning to musical systems.

Marlon Schumacher — Germany

<https://cnmat.berkeley.edu/news/marlon-schumacher-joins-cnmat-spring-residency>

Marlon worked on independent projects in computer music and collaborated with Prof. Carmine-Emanuele Cella.

Rafal Zapala — Poland

<https://cnmat.berkeley.edu/news/rafal-zapala-working-fulbright-project>

As a visiting Fulbright scholar, Rafal conducted research into real-time interactive systems for non-linear music composition and performance.

∞ Han Zhang — China

<https://cnmat.berkeley.edu/news/cnmat-welcomes-han-zhang>

Worked with Prof. Carmine Cella on the application of machine learning to computer assisted orchestration.

GUEST COMPOSERS, MUSICIANS, ENSEMBLES

- † CNMAT USERS GROUP. Organized by students at CNMAT with support from the CNMAT staff and matching resources from CNMAT and student grants
- ∞ CNMAT DEI (Diversity, Equity, Inclusion). Initiative to promote and present underrepresented groups and individuals involved in creative computing and music
- § CNMAT/MUSIC DEPT. Organized and presented in collaboration with the Department of Music and/or other CNMAT Affiliates

∞ Murat Colak

<http://www.muratcolakmusic.com>

Jean Geoffroy

<https://jeangeoffroy.wordpress.com>



Hashtag Ensemble

<http://hashtag-ensemble.org>

∞ Minh-Tâm Nguyen

<http://minhtamnguyen.com>

∞ Rage Thormbones

<https://ragethormbones.com>

∞ Laetitia Sonami

<https://sonami.net>

†§ Splinter Reeds

<http://www.splinterreeds.com>

Michele Tadini

<http://micheletadini.net>

∞ Januibe Tejera

<https://www.januibetejera.com>

∞ Viola Yip

<https://www.violayip.com>

CNMAT PARTNERSHIPS AND INSTITUTIONAL COLLABORATORS

† CNMAT USERS GROUP. Organized by students at CNMAT with support from the CNMAT staff and matching resources from CNMAT and student grants

∞ CNMAT DEI (Diversity, Equity, Inclusion). Initiative to promote and present underrepresented groups and individuals involved in creative computing and music

§ CNMAT/MUSIC DEPT. Organized and presented in collaboration with the Department of Music and/or other CNMAT Affiliates

§ Conservatoire National Supérieur de Musique et de Danse de Lyon (CNSMD)

<https://cncmat.berkeley.edu/news/cncmat-lyon-conservatory-exchange>

Under an MOU CNSMD and CNMAT sponsored a joint exchange concert series featuring graduate student compositions. The first concert happened in December 2021 with CNSMD students and professors hosted at CNMAT. The second concert will happen in the winter of 2022-2023 in Lyon, France with CNSMD hosting a concert of CNMAT students.

∞ Sound Encounters with the San Francisco Contemporary Music Players (SFCMP) and CNMAT

Sound Encounters features a yearly concert of new music as part of the SFCMP annual series in San Francisco and featuring new music and media from CNMAT-based composers.

Letters and Sciences Music Salon with Prof. Edmund Campion, CNMAT

Organized by Kat Kneisel and Janet Broughton.

CNMAT RESEARCH & DEVELOPMENT / PROJECTS & PROTOTYPES

† CNMAT USERS GROUP. Organized by students at CNMAT with support from the CNMAT staff and matching resources from CNMAT and student grants

∞ CNMAT DEI (Diversity, Equity, Inclusion). Initiative to promote and present underrepresented groups and individuals involved in creative computing and music

§ CNMAT/MUSIC DEPT. Organized and presented in collaboration with the Department of Music and/or other CNMAT Affiliates

∞ *Augmented Mbira*

<https://cncmat.berkeley.edu/news/towards-first-model-augmented-mbira>

Prof. Carmine-Emanuele Cella worked in collaboration with African mbira maker, Ozias Macoo, to build an augmented mbira for a new composition.

†∞ *CNMAT Pedagogy*

Jon Kulpa developed a software access system gathering all CNMAT pedagogical software into one linked space and organized by topics in teaching. These tools are open-source and shared world-wide through the GitHub software hosting platform.

∞ *CNMAT Depot 2.0*

Edmund Campion, Luke Dzwonczyk, Jon Kulpa, Jeff Lubow rebuilt the original CNMAT Depot to further incorporate CNMAT developed software and systems into an easy to access and navigate repository.

CNMAT PC-2410

A conversion box that allows for driving consumer level amplifiers from professional-level signal sources. This box pads and properly unbalances signals of up to +24 dBu for use with -10 dB amplifiers. Switchable between +4, +12 and +24 dBu inputs, with TRS/XLR combo jack inputs, RCA outputs and a in-ear frequency response from 30Hz-20kHz, the PC-2410's form factor pairs well with modern class-D amplifiers commonly used in tactile transducer workflows. It features a custom RF-shielded PCB, modular H-pad design and 3D printed enclosure.

Tactile Transducer Mounting System

<https://cnmat.berkeley.edu/news/3d-printed-mount-tactile-transducer>

A 3D printed bracket and textile harness system for securing tactile transducers to string instrument backplates without the need for adhesives or other invasive mechanical attachments. The [3D printed bracket](#) snaps onto the magnet/spider of a [DAEX58FP](#) tactile transducer and accepts 1" nylon belt strapping that can be tightened to hold the transducer fast against the instrument backplate.

∞ CNMAT Externals v1.0.5 Release

<https://cnmat.berkeley.edu/news/cnmat-externals-v105-released-odot-pre-release>

With the advent of new Apple Silicon architectures in 2021, the CNMAT Externals package for Max needed to be updated to work with the newly refactored Max SDK, which provides support for Arm64 processors. Cycling74 required the entire package (comprising more than 50 objects) to run on arm64 and x86_64 architectures under both Mac OS and Windows. This required updating the build system and servicing package dependencies for CNMAT Externals. The Apple Silicon release was finalized in January 2022 and the full package was released through the Max package manager in April 2022. All CNMAT software is open-source and freely released on the GitHub platform.

Portable Cradle System for cello

This is a mounting system for safely and securely mounting a cello in a horizontal orientation so that it can be played by two players at once. The stand is adjustable and contacts the instrument in just 4 places in order to preserve resonance. The cradle is designed to fold and/or be dismantled to fit in a composer's luggage and is inexpensively fabricated from 3/4" plywood with the aid of a CNC router and commonly available hardware.

CueBox

Built in collaboration with composer David Coll and based on prior work related to the CNMAT Stompbox 2.0, the CueBox is a device for cueing actions of performers with text and light cues over a wired or wireless network. The device features a 4x20 back-lit character display, a time-of-flight proximity sensor and stoplight LEDs. The Cuebox is PoE powered over a single ethernet connection and accepts OSC commands for the display. Instructions are executed by the performer with the aid of an OSC-cued light phrase (red-yellow-green) next to the screen. The integral proximity sensor can be used to determine if a person/performer is present in front of the screen and the distance value of this sensor is transmitted to the host computer. The Cuebox is based on the ESP32-POE-ISO variant from Olimex and features a custom fabricated PCB for compact construction and mounting.

CNMAT Stompbox 2.0

An extension of the CNMAT Stompbox idea with PoE networking, character display and QWIIC connect sensor integration, the CNMAT Stompbox 2.0 features connections for up to 16-foot switches or expression pedals and chained I2C sensors. Network connection is negotiated with the aid of the character display which displays the unit's IP address/port on startup. The user need only to send an OSC message to this address and the unit will begin streaming all sensor values over the network to the host computer's address. The Stompbox 2.0 is based on the ESP32-POE-ISO and features a custom PCB and a laser-cut and etched acrylic enclosure.

PolyEnd Percussion Mounting System

Laser cut laminated armature system with integral force-multiplying locking hinges. The system is quickly and cheaply fabricated from sheet steel with the aid of a fiber laser cutter and readily sourced components. Provides rigid, repeatable mounting of solenoid percussion actuators with millimeter precision and nearly zero deflection in the force vector plane so that, once installed, the actuator beater remains engaged with its target, reliably and repeatably through the duration of the performance.

PUBLICATIONS

2022 Carmine-Emanuele Cella, Luke Dzwonczyk, et al: *A Study on Neural Models for Target-Based Computer-Assisted Musical Orchestration*

<http://www.carminecella.com/research.html>

2022 Carmine-Emanuele Cella, et al: *Target-based computer-assisted orchestration: Complexity and approximation algorithms*

<https://cnmat.berkeley.edu/news/new-paper-complexity-computer-assisted-orchestration>

2022 Carmine-Emanuele Cella, Daniele Ghisi et al: *A three-dimensional timbre model via Peano curves*

<https://cnmat.berkeley.edu/news/mathematical-modeling-music-timbre>

2022 Carmine-Emanuele Cella, et al: *Color and Timbre Gestures: An Approach with Bicategories and Bigroupoids*

<https://cnmat.berkeley.edu/news/mathematical-modeling-music-timbre>

MUSIC DEPARTMENT COURSES SUPPORTED BY CNMAT

CNMAT/MUSIC DEPT. Organized and presented in collaboration with the Department of Music

Fall Term: MUS 107/207 (advanced projects in computer music)

Spring Term: MUS 207

MUS 30 (50 students)

MUS 29 (370 students)

MUS 158a

MUS 158b

GRANTS AND FUNDING

Hewlett Arts Commission

CNMAT advanced to round two of a Hewlett Arts Commission grant process for a Media Arts Commission with CNMAT affiliate, digital artist and feminist writer, Claudia Hart (<https://cnmat.berkeley.edu/people/claudia-hart>). Final round pending.

CNMAT Users Group

GA Fall Grant: *Rage Thormbones* — \$400

Townsend Fall Grant: *Rage Thormbones* — \$500

GA Contingency: *Mixing and Mastering Class* — \$1000

GA Spring Grant: *Rage Thormbones* — \$1500

Townsend Spring Grant: *Rage Thormbones* — \$500

GA Contingency: *Viola Yip and Letitia Sonami* — \$1200

GA Contingency: *Andrew Harlan Rage Tech Support* — \$1200

GA Contingency: *Kevin Fairbairn* — \$1200

STAFF

New Acting Associate Director Hired

In June of 2021 Richard Andrews—Associate Director, retired. Jeremy Hunt was hired as Acting Associate Director in August 2021.

<https://cnmat.berkeley.edu/news/jeremy-hunt-joins-cnmat-acting-associate-director>

FACILITIES

Wood Floor Refinishing

In August 2021 the wood floor in the main room was repaired and refinished.

Speaker Array Expansion

CNMAT Main Room expansion to 16.9 channel surround sound: ahead of Hans Tutschku's November lecture and concert, we supplemented the existing 8.8 channel Main Room Array with the CNMAT Mobile array to form a 16.9 channel surround theater. Each speaker in this setup was re-equalized, delayed and gain-staged to yield a maximally flat frequency response (+/- 1 dB) from 30Hz through 20kHz. Specific attention was given to ensure phase linearity through the crossover region(s) of each loudspeaker. The result is a seamless 16 channel system with automatic subwoofer integration (no need for separate subwoofer signals) that addressed via optical MADI connection.

ACADEMIC APPOINTMENTS FOR CNMAT AFFILIATED GRADUATES

Rama Gottfried

Professor of Contemporary Computer Music Practice, Zurich University of the Arts

<https://cnmat.berkeley.edu/news/rama-gottfried-appointed-professor-zurich-university-arts>

Matthew Schumaker

Assistant Professor of Music, University of California—Santa Cruz

<https://cnmat.berkeley.edu/news/matt-schumaker-assistant-professor-uc-santa-cruz>