Sound and Video Anthology: Program Notes

Women in Computer Music: Mara Helmuth, Curator

About the Music

This collection of works represents a journey through different sonic perspectives, from composers who have impacted us, and compelled us to think differently about music, sound art, composition, gender, or technology. They disrupt stereotypes about what music by women should be. Each composition represented here is an uncommon and meaningful adventure by a sound-exploring composer, ranging from Laurie Spiegel's 1987 work to Elizabeth Hoffman's piece from December 2019, and the approaches taken are diverse.

The pieces are arranged to provide three concert-length listening sessions. The first session begins with the scratchy, driving rhythms of Judith Shatin's "Tape Music" in stereo or 5.1 audio, proceeds to explorations of remote, underwater sounds in Annea Lockwood's "Dusk," to Elizabeth Hoffman's subtle and timbrally churning "Clouds Pattern." The precise and playful acousmatic composition, "Bastet" by Elsa Justel, precedes Judy Klein's mesmerizing tribute to lost lives in "Railcar." An exuberant memorial follows this, to a former teacher, in Elizabeth Hinkle-Turner's "EvenMoreduSt."

Laurie Spiegel's timbral rhythms from her piece "Passage" begins the second session, followed by Hildegard Westerkamp's sonic love poem "Für Dich—For You," based on a text by Rainer Maria Rilke. Natasha Barrett's intricate audio work, "Pockets of Space," was originally created for a virtual reality environment and may be heard here in binaural (for headphones) or stereo audio versions. The new, spirited composition by Margaret Schedel, "QfwfQ," for the duo Hear | Say, presents melodic and rhythmic drive. The final work in this session is a compelling video by Loadbang performing Paula Matthusen's "Old Fires Catch Old Buildings."

The third session begins with Carla Scaletti's extraordinary "H→gg," involving sonification of potential Higgs boson particle data from the Large Hadron Collider atom-smasher at CERN, in stereo, and in multichannel, or video, of a dance collaboration version of the piece. Next, Katharine Norman's "A Walk I Do" reveals elegantly unfolding flute-based sounds and graphics. Frances White's "The Old Rose Reader," written for and performed by violinist-composer Mari Kimura, is a meditation on the beautiful French names of old rose species and related stories. "Sound Dunes" is my third compositional collaboration with tárogató performer Esther Lamneck, whose incredible improvisations, as well as the natural contours of sand dunes, inspired this piece.

To make the number of pieces manageable, I decided to include works that are not installations, because those could not be fully experienced online, and pieces by living composers who are usually not focused on performing. I also wanted a measure of geographical diversity. There were more composers' works I would have liked to include, as well as other strategies for inclusion. I hope you will find them in a future anthology. I would like to thank Judy Klein for the perceptive advice she gave me at many steps in the curatorial process.

To set playback levels at an appropriate uniform volume, you could first set the level for the loud beginning of piece six, Elizabeth Hinkle-Turner's "EvenMoreduSt."

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Part 1 (50 minutes)

Tape Music (2015)—Judith Shatin

"Tape Music" is a meditation on tape as a collection of materials that are emblematic of our throwaway culture, and can still be used to mend items that would otherwise be consigned to the trash heap. It is also a nostalgic tribute to the genre of tape music that persists despite the ongoing changes in playback media. The initial spur for "Tape Music" came from an NPR broadcast about a factory. As I heard the sounds of boxes being taped up, I immediately decided to compose "Tape Music." Assisted by sound engineer Mark Graham, I made recordings of myself ripping, cutting, squashing, and otherwise messing with a wide variety of types of tape, as well as taping, and then slashing, boxes. Various microphones were used and isolated on different tracks to maximize the sonic potential. The original version of "Tape Music" is for 5.1 surround sound, but it also exists for stereo and quadrophonic versions.

Track Duration: 7:09

Judith Shatin is a composer and sound artist whose musical practice engages our social, cultural, and physical environments. She draws on expanded instrumental palettes and a cornucopia of the sounding world, from machines in a coal mine to the shuttle of a wooden loom, a lawnmower racing up a lawn, or the sounds of zippers being pulled. Timbral exploration and dynamic narratives are fundamental to her compositional designs, and collaboration with musicians, artists, and community groups are central to her musical life. Her sonic antennae are always up, listening for the sounds on the edges of acoustic instruments as well as everyday objects and phenomena. Shatin's music has been commissioned by organizations including the Barlow Endowment, Fromm Foundation, Carnegie Hall, and many others. It has been featured at festivals including Aspen, BAM Next Wave, and Havana in Spring. Orchestras that have presented her work include the

Figure 1. Judith Shatin.

Figure 2. Annea Lockwood.

Denver and Houston Symphonies, as well as the American Composers Orchestra. Her music can be heard on labels including Centaur, Innova, and Neuma. Shatin's interest in electronic media began while she was still in high school, and in 1987 she founded the Virginia Center for Computer Music at the University of Virginia, where she is William R. Kenan, Jr. Professor Emerita.

Dusk (2012)—Annea Lockwood

This piece is dedicated to Elizabeth Wood and features percussionist William Winant. Hydrothermal vents were given to the project by Dr. Timothy Crone, the Lamont-Doherty Earth Observatory, Columbia University. Transposed bat recordings were from Avisoft Bioacoustics, Berlin: (www.avisoft.com/sounds.htm).

With warm thanks to Dr. Timothy Crone for the use of his hydrothermal vent recordings, made on the mid-ocean Juan de Fuca Ridge, 200 miles off the coast of Washington State, and discussed in his article "The Sounds Generated by Hydrothermal Vents" published in *PLoS ONE*.

If possible, please playback this piece using a subwoofer, because some frequencies important to the piece are in the region of 45 Hz.

Track Duration: 6:59

Annea Lockwood is known for her explorations of the rich world of natural acoustic sounds and environments, in works ranging from sound art and environmental installations, through text-sound to concert music. Recent works include "Water and Memory," for the Holon Scratch Orchestra, Israel; the installation Wild Energy, a collaboration with Bob Bielecki—a site-specific installation focused on geophysical, atmospheric and mammalian infrasound and ultrasound sources; and "Becoming Air" in collaboration with Nate Wooley, trumpet.

Lockwood's music has been presented in many venues and festivals, including the 2016 Tectonics/BBC Festival, Glasgow; Issue Project Room, Brooklyn; Miller Theatre Composer Portrait series, New York; and Café Oto, London. Her music has been issued on CD, vinyl, and online on labels including Lovely Music, New World, and Ambitus.

Clouds Pattern (2019)—Elizabeth Hoffman

> To make myself understood and to diminish the distance between us, I called out: "I am an evening cloud too." They stopped still, evidently taking a good look at me. Then they stretched towards me their fine, transparent, rosy wings. That is how evening clouds greet each other. They had recognized me. (Rainer Maria Rilke, *Stories of God*)

I am grateful to have had the chance to work intensively for several weeks while on a Klingler Electroacoustic Residency in 2018 at Bowling Green State University, developing the eight-channel materials that are the source for the stereo version of this piece.

Track Duration: 9:33

Elizabeth Hoffman studied electronic music with Bülent Arel while pursuing an MA at Stony Brook University, and then computer music with Diane Thome, John Rahn, and Richard Karpen during doctoral studies at the University of Washington School of Music. Daria Semegen was also a strong influence. Briefly on faculty at the University of Minnesota, then at New York University since 1999,

Figure 3. Elizabeth Hoffman.

Hoffman has made it a priority to support women (and all students) in computer music through recruitment and teaching that values diverse perspectives on aesthetics, uses of technology, perception, theoretical discourse, and collaborative learning. She co-directs the Waverly Labs for Computer Music Composition and Research. She is also a pianist and has strong interests in critical theory, acoustic composition, timbral spatialization, and music's relation to subjectivity. She is focused on the potentials of the multichannel medium and on mixed musics, where designed software is simultaneously instrument, specific composition, and variably realized structure allowing new kinds of conversations with performers. Since 2019, a permanent algorithmic sound installation of hers, (RETU(R)NINGS), has played daily at sunset in New York University's Bobst Library Atrium. Her electroacoustic music has been recognized by awards from Bourges, Prix Ars Electronica, Pierre Schaeffer International Competition, and many other institutions. Hoffman's electroacoustic music is published primarily on Empreintes DIGITALes.

Bastet (2004)—Elsa Justel

Bastet, a naughty cat deity, has slipped into the piano box. Confused by the strange appearance of this place, she tries to find the exit while holding onto the strings.

This project is based on the notions of ambiguity, instability, and chance. The material comes from sounds produced by piano strings, guitar, and snare drum through unconventional modes of excitement (by rubbing, scratching and hitting, or using various items, such as wooden and metal sticks, nail file, paper, etc.). I was exploring the spectral instability unique to string sounds with the intention of producing nuances of character and effects of ambiguity. Some digital treatments allowed me to change the personality of sound, so it was possible to obtain sounds similar to percussion or wind instruments. Also, I have let chance, as an ineffable assistant, play a role to lead me to unexpected discoveries. [English translation: François Couture]

"Bastet" was realized in 2004 at the studio of the Association pour la recherché et l'expérimentation musicale (APREM) in Nevers, France, and premiered on 20 March 2004 during the concert season of APREM at the Théâtre municipal de Nevers. The piece was commissioned by the French State (Music Office) and the APREM.

Track Duration: 10:37

Born in 1944 in Mar del Plata, Argentina, **Elsa Justel** obtained a

Figure 4. Elsa Justel.

Professor Diploma in Music Education and Choral conducting at the Conservatory of Mar del Plata. She studied composition at the University of Rosario with Virtú Maragno and electroacoustic music in Buenos Aires with José Maranzano and Francisco Kröpfl.

In 1998 she moved to France where she graduated with a doctorate in Esthetics, Sciences, and Technologies of Arts at the Université de Paris VIII under the direction of Horacio Vaggione. She taught new composition techniques at the Conservatorio Provincial de Música Luis Gianneo in Mar del Plata, Argentina; sound techniques and sound form at the Université Paris-Est Marne-la-Vallée; and electroacoustic music at the Universitat Pompeu Fabra in Barcelona. She has published various articles on electroacoustic and video music, and has participated in many conferences as a speaker.

Justel's music received awards from competitions including: Tribuna nacional de compositores (TRINAC) in Argentina; Viseu Rural 2.0—Explorações Sonoras de um Arquivo Rural, in Portugal; and the Prix biennal Presque rien in France. She has also realized audiovisual projects and music for film and the stage. Her video music *Destellos* won prizes at the Video Evento d'Arte competition (Italy) and the Bourges competition (France).

Figure 5. Judy Klein.

Figure 6. Elizabeth Hinkle-Turner.

Railcar (2008)—Judy Klein

At one end of the railcar was a glass bin, filled with paper clips. I added the few I had brought with me, in memory of the lives of so many.

This piece was commissioned by the Institut International de Musique Electroacoustique de Bourges (IMEB) and was premiered in 2008 at the 38th Festival Synthèse in Bourges, France.

Track Duration: 9:08

Judy Klein received her degree in music from the Conservatory of Music in Basel, Switzerland, and a Master's Degree from the Gallatin School at New York University. She studied computer music with Charles Dodge at the Brooklyn College Center for Computer Music, and was a long-term affiliate of the Center while it was under his direction. During the 1980s, she taught computer music composition in the New York University SEHNAP Department of Music and founded a computer music studio there. From 1990 to 2006 she was a consultant at Lincoln Center's New York Public Library for the Performing Arts, where she created an archive for the preservation of analog and digital electroacoustic music. She has been a guest composer and lecturer at various colleges and conservatories, including Dartmouth College, Columbia University, and the Brooklyn College Center for Computer Music. In 2007 she was a resident artist at the Bourges International Institute of Electroacoustic Music.

She composes almost exclusively using the C programming language and the Csound computer music language. Her works are primarily acousmatic and increasingly combine her love of sound with her commitment to animal rights. Probably best known is her piece "The Wolves of Bays Mountain." Other pieces by her can be heard on the ICMA, SEAMUS and Cuneiform labels. Klein currently resides in New York City, where she works in her home studio. She continues to lecture at local colleges and serves on juries for electroacoustic music competitions and selection committees for electroacoustic music festivals and conferences. She is a member of the Steering Committee for the New York City Electroacoustic Music Festival and is a contributing editor for *The Open Space Magazine* and for *Perspectives of New Music*.

EvenMoreduSt (2008)—Elizabeth Hinkle-Turner

This piece, written in commemoration of the 50th anniversary of the Experimental Music Studios of the University of Illinois, pays homage to the legacy of the great musicians and teachers who have worked at that facility. One of these, of course, was Herbert Brün. Although he was by no means my only mentor and teacher at the University of Illinois at Urbana-Champaign, in retrospect I have come to realize that he was, beyond a doubt, the most influential. I guess I can credit Brün with, as he put it, "ruining my career" as a music professor: His teaching infused me with an idealism and an impatience that is simply insupportable in today's academic culture, and which caused me to throw up my hands in despair and throw in the towel on teaching several decades ago, and I have never regretted it. I remember the day that Brün (together with Arun Chandra) presented the Sawdust project to me and some other new students, and played the pieces that resulted from his program. "EvenMoreduSt" is my own poor commentary and tribute to those works, plucking the characteristics that excited me the most upon listening to them. Like the originals, my work uses sawtooth waves . . . but of a different type of saw altogether (thanks to my late husband, for those recording hours in his woodworking shop!).

Track Duration: 6:00

Elizabeth Hinkle-Turner received her DMA in music composition from the University of Illinois at UrbanaChampaign. She has served as acting director of the electronic and computer music studios at Florida International University in Miami and the Experimental Music Studios at

the University of Iowa, and has been a faculty member at the University of Illinois, the Oberlin Conservatory, and the University of North Texas (UNT). She served on the board of the Society for Electroacoustic Music in the United States (SEAMUS) for ten years, returning in 2018 in the new position of director of diversity for the organization, and has been on the board of the Canadian Electroacoustic Community (CEC) and the International Alliance for Women in Music (IAWM).

Currently, she makes her living as the Director of Instructional IT Services at UNT, while occasionally teaching courses in UNT's College of Music and College of Visual Art and Design. Hinkle-Turner is the author of *Women Composers and Music Technology in the United States* (published by Ashgate, now Routledge, in 2006) and is working on the second edition of this text and subsequent books in the series. She is also the creator of *Full Circle*, a work for CD-ROM that received an award from the Institut International de Musique Electroacoustique de Bourges, and the blog, afterthefire1964.blogspot.com, a site devoted to assisting those who are currently dealing with alcoholic or addicted spouses and other loved ones.

Part 2 (69 minutes)

Passage (1987)—Laurie Spiegel

Having worked predominantly on the "note" level of music (algorithmic work with harmony, melody, counterpoint, or line), I felt like revisiting the timbral and textural sonic spaces that had deeply involved me before I began using computers.

"Passage" was as close as I could get to an old-fashioned analog electronic piece, but made with modern, digital tools. For a change of emphasis I wanted to build a dramatic experience out of texture, timbre, and resonance, with minimal use of harmony, melody, counterpoint, or line, with which I've been predominantly concerned in my work in recent years.

I began with a MIDI sequencer file containing a14-minute-long static chord, and started to compose and edit MIDI continuous controller changes for the timbres and balances. After I had what felt like the ghost outline of the piece, I added other parts, with more movement and variation, to capture and make audible to others what the initial timbral shape had suggested to the inner ear of my imagination.

The result, evolved through a progressive process of clarification inside my own mind over several weeks, expresses a forceful energy of propulsion, an ongoing momentum travelling through a variety of textures and moods with, as I experienced it, a life of its own.

For this piece I used a Yamaha TX816 FM synthesizer, Eventide 2016 and Korg DRV3000 digital signal processors, and a Hill 16-channel mixing board, and software including Music Mouse (written by me) running on an Amiga 1000 computer, and Mark of the Unicorn's Performer sequencer running on a 512k Macintosh computer. No other instruments besides Music Mouse were used: no keyboards, faders, or other physical controllers.

Track Duration: 14:03

Although coming from a background of folk, pre-Classical, classical, and analog electronic music, **Laurie Spiegel** has been involved in the creation of computer technology for music in various ways, starting with her residence at Bell Telephone Labs where she worked with Groove,

Figure 7. Laurie Spiegel.

the Alles synthesizer, Max Mathews's RTSked, and her own Vampire audiovisual composing software. Subsequently she contributed to the design and implementation of the alphaSyntauri system for the Apple II, the McLeyvier (a language-based LSI 11/23 music processor), and other computer technologies for composition, performance, and audio signal processing. She is best known for her realization of Johannes Kepler's *Harmonices Mundi*, which was included on the Voyager Spacecraft's *Sounds of Earth* golden record, and for Music Mouse, her "intelligent instrument" software for live improvisation running on Macintosh, Amiga, and Atari computers.

Für Dich—For You (2005)—Hildegard Westerkamp

The compositional process of "Für Dich—For You" included an intense encounter with Rainer Maria Rilke's poetry (English translation by Norbert Ruebsaat), not unlike an encounter with the experience of love itself and

Figure 8. Hildegard Westerkamp.

all its unsettling, complex emotional states. The poem speaks of one person's love to another, but also—and perhaps more importantly—about love as an inner state towards life and the world as a whole. On another level the composition explores a sense of place and belonging, of home and love. To underscore this context, the sound sources for the piece consist of specific sounds from two places that have created a sense of belonging in me: North Germany, where I was born and grew up, and Vancouver and the west coast of Canada, where I have lived for over thirty years as an immigrant. These sounds form the sonic and musical language of the piece, together with the recorded male and female voices of people close to me, speaking the poem, both in German and in English.

The readers of the poem are Wendelin Bartley, Susan Benson, Anne Bourne, Louie Ettling, Peter Grant, Andra McCartney, Norbert Ruebsaat, Sonja Ruebsaat, Susanna Ruebsaat, R. Murray Schafer, Agnes Westerkamp and myself. "Für Dich—For You" was commissioned by the Zentrum für Kunst und Medien (ZKM), Karlsruhe. The composition was started during a residency at the ZKM, and was continued and completed in the Sonic Studio at Simon Fraser University and in the composer's own studio in Vancouver.

["Für Dich—For You" © 2005 Norbert Ruebsaat, Hildegard Westerkamp (SOCAN), Yul média (SOCAN); ℗ 2009 Enregistrements i média (SOPROQ). Previously released in 2009 by Empreintes DIGITALes on the album *trans_canada* (IMED 09100). Used with permission.]

Track Duration: 14:03

Composer **Hildegard Westerkamp** focuses on listening, environmental sound, and acoustic ecology. At the beginning of her career she worked with R. Murray Schafer and the World Soundscape Project. She is a founding and board member of the World Forum for Acoustic Ecology and was a long-time editor of its journal *Soundscape*. She has conducted soundscape workshops, given concerts and lectures, and has coordinated and led soundwalks locally and internationally. In 2003 Vancouver New Music (VNM) invited her to coordinate and lead public soundwalks as part of its annual concert season. This in turn inspired the creation of the Vancouver Soundwalk Collective, whose members are continuing to lead walks on a regular basis. For some years she has mentored a variety of younger composers, sound designers, soundwalk leaders, and people pursuing careers in soundscape studies and acoustic ecology. Excerpts of her compositions appear in Gus van Sant's films *Elephant* and *Last Days*, and more recently she collaborated on the soundtrack of Nettie Wild's film *Koneline.* Her newest composition, "Klavierklang" for pianist Rachel Iwaasa, had its world premiere at ISCM's World Music Days in Vancouver, November 2017. Also in 2017, Hildegard's ways of composing and listening were presented on CBC IDEAS: http://www.cbc.ca/radio/ideas/how-opening-our-ears-can-open-our-minds-hildegard-westerkamp-1.3962163.

Pockets of Space (2018)—Natasha Barrett

"Pockets of Space" is the music for the 3-D video and virtual reality work of the same name. The work is a collaboration between Natasha Barrett and United States–based visual artists Marc Downie and Paul Kaiser, known collectively as OpenEndedGroup.

The work was originally composed in seventh-order 3-D Ambisonics for concert performance, and as an interactive binaural version for virtual reality headset. Stereo and binaural versions are presented for this present edition.

Throughout the work, audio and visual scenes transform between states verging on both reality and abstraction, created by experimental methods involving the spatial decomposition and recomposition of source materials.

Some of the musical materials began as real Ambisonics sound recordings that were then decomposed to reveal sound objects and their spatial-frequency fingerprint. From these experiments, new materials were then abstracted and explored, and sometimes fed into the visual artwork. Other musical materials drew instead from the visual art, where Downie decomposed images into pixel information and implemented his own custom-made algorithmic processes. These processes revealed unique geometries and eccentric physics, which were in turn fed back into sound synthesis to create new spatial-audio imagery.

Figure 9. Natasha Barrett.

This work was commission by the Institut de Recherche et de Coordination Acoustique/Musique (IRCAM) and premiered at the Centre Pompidou, Paris.

Track Duration: 14:53

Natasha Barrett composes acousmatic and live electroacoustic concert works, multimedia projects, and installations. The musical application of spatial audio has guided her work since the late 1990s, and she is a leading voice in the new wave of artists working with Ambisonics, 3-D sound, and its contemporary music context. Her inspiration comes from the world around us: the way it sounds and behaves, systems, processes, and resulting phenomena. These interests have led her into the realms of cutting-edge audio technologies, geoscience, sonification, motion tracking, and some exciting collaborations involving instrumental ensembles, visual artists, architects, and scientists. Her work has been commissioned, performed, and broadcast throughout the world. She has received international awards including the Nordic Council Music Prize and the Euphonie d'Or in the Bourges International Electroacoustic Music Awards. Originally from the United Kingdom, Barrett moved to Norway in 1999. Active in performance, education, and research, she is codirector of the Norwegian spatial-music performance ensemble Electric Audio Unit and founder of 3DA, the Norwegian society for 3-D sound art. Besides her career as an independent composer she currently holds a professorship at the Norwegian Academy for Music in Oslo.

Figure 10. Margaret Schedel.

QfwfQ (2019)—Margaret Schedel

The title of this piece takes its name from the interdimensional narrator of many of Italo Calvino's short stories, including the collection *Cosmicomics*, which describe the beginnings of the world using both scientific hypotheses and comic language. Like the unknowable, unpronounceable QfwfQ, who has experienced all of time and space, this work explores multiplicities of being, paradoxes and contrasts. The piece is scored for two alto instruments, or any treble instrument capable of reaching down to the G below C4. The players read from a two-line score and can choose to switch parts at bar lines that demarcate sections of varying length. The two lines have contrasting characters and are each treated to different electronic manipulations that create multiple voices. The bottom line is lyrical, almost romantic in character, and its electronics create a Bulgarian chorusing effect through time, pitch, and timbre shifting. This chorusing effect can accrue up to 96 voices and is reset when performers switch parts. The top line has an angular, disjunct, modern character and also includes occasional percussive sounds. The electronics part loops some of the percussive sounds, and by the end of the piece, these create a third drum line. In total, this single piece played by two instruments can ultimately evolve into as many as 99 possible lines, which can be in agreement or in conflict depending on the musical performance. Only at the center of the piece do the two instrumentalists play the same melody, in a "weeping" fado-like passage that briefly unifies the voices before they diverge again.

The multiphonic, indeterminate, and polystylistic character of this piece is best described in Calvino's story "A Sign In Space," which is a kind of parable of the postmodern condition. In it, QfwfQ makes a mark to note the revolution of the Sun around the Milky Way galaxy (the first sign ever made), only to find after many millennia that many others had also made similar signs and the original sign was gone. QfwfQ ruminates on the experience of looking at the marks of millions of beings in space: "In the universe now there was no longer a container and a thing contained, but only a general thickness of signs, superimposed and coagulated . . . constantly being dotted, minutely, a network of lines and scratches and reliefs and engravings." (Note by Katherine Kaiser.)

Special thanks to Matthew Blessing for his help with the chorusing

Figure 11. Paula Matthusen.

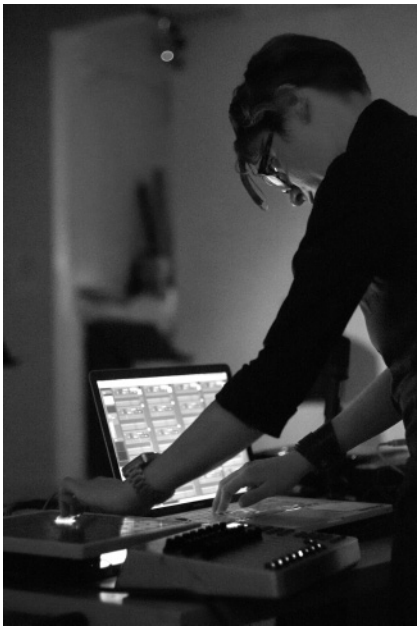
patch, and the reACT ensemble for commissioning, inspiring, and workshopping the piece.

Track Duration: 8:05

With an interdisciplinary career blending classical training in cello and composition, audio data research, and innovative computational arts education, **Margaret Schedel** transcends the boundaries of disparate fields to produce integrated work at the nexus of computation and the arts. She has a diverse creative output represented with works such as the interactive multimedia opera *The King Listens*, virtual reality experiences, sound art, video game scores, and compositions for a wide variety of classical instruments or custom controllers with interactive audio and video processing. An Associate Professor in the Department of Music at Stony Brook University, she currently serves as the Chair of the Art Department and leads the Making Sense of Data Workgroup at the Institute of Advanced Computational Science.

Old Fires Catch Old Buildings (2018)—Paula Matthusen

"Old Fires Catch Old Buildings" draws its title from William S. Burroughs's writing about recording in "The Invisible Generation." Rather than play with the text of Burroughs's original writing, the piece instead engages with physical recordings (namely cassette tapes) of each of the ensemble members. The language flexibility combined with the idiosyncrasies and manipulability of recording and playback devices forges intriguing interdependencies between the musicians and their stored voices. As Burroughs notes, "it is the height of rudeness not to record



when addressed directly by another tape recorder."

Track Duration: 10:40

Paula Matthusen is a composer who writes both electroacoustic and acoustic music and realizes sound installations. She has written for diverse instrumentations, such as found in her piece "Run-On Sentence of the Pavement," for piano, ping-pong balls, and electronics. Her work often considers discrepancies in musical space: real, imagined, and remembered.

Her music has been performed by ensembles including Alarm Will Sound, International Contemporary Ensemble (ICE), and the Bang On A Can All-Stars, and soloists including Andy Kozar, Kathleen Supové, and Margaret Lancaster. Her awards include the Walter Hinrichsen Award from the American Academy of Arts and Letters, a Fulbright Grant, and the 2014 Elliott Carter Rome Prize.

Matthusen is currently an Associate Professor of Music at Wesleyan University, where she teaches experimental music, composition, and music technology.

Part 3 (53 minutes)

H→gg (2017)—Carla Scaletti

The title "H→gg" is shorthand for an event where a Higgs boson particle decays into two gamma particles. When CERN announced on 4 July 2012 that they had evidence of the existence of the Higgs boson, they were careful not to say that they had detected a Higgs boson, which, if it is produced, decays so quickly that it would never reach the detector. Instead they presented statistical evidence for the production of an excess of gamma particles at the mass–energy level that predicted a Higgs boson and, based on other variables of the collision, were likely to have been the result of the decay of a Higgs boson.

The work "H→gg" is a 15-minute distillation of the 50-minute score for choreographer Gilles Jobin's *Quantum*, premiered at CERN in September 2013 at the Compact Muon Solenoid (CMS) experiment, 300 feet above the tunnel where the Higgs boson was discovered. Sound materials for the piece came from work I had done previously with Lily Asquith on mapping data from the ATLAS Experiment at the Large Hadron Collider (LHC) to sound. Asquith is one of the CERN physicists who coauthored the article "Observation of a New Particle in the Search for the Standard Model Higgs Boson with the ATLAS Detector at the LHC." The parameters of the sounds you hear in the piece were modulated, or controlled, by variables of collision events recorded at CERN, in a sense

Figure 12. Carla Scaletti.

Figure 13. Katharine Norman.

making the LHC the world's largest data-driven musical instrument.

Track Duration: 16:26

Carla Scaletti is a composer, designer of the Kyma sound-design language, and cofounder of the Symbolic Sound Corporation. She creates music in a genre she calls mu-sci ("μ-psi"), the musical analog to sci-fi. Each of her compositions poses a question in the form of a "what-if" hypothesis, and proceeds to explore the entailments of that hypothesis in the manner of speculative fiction.

Winner of the 2017 SEAMUS Award and the 2017 Sound award from the Women's International Film and Television Showcase (WIFTS), Scaletti serves on the editorial board of the *Computer Music Journal* and presented keynote addresses at the International Conference on Auditory Displays (ICAD 2017) (https://youtu.be/T0qdKXwRsyM), and the International Computer Music Conference (ICMC 2015), the latter published in *CMJ:* (https://www.mitpressjournals.org/doi/pdf/10.1162/COMJ_a_00341).

Each year, she co-organizes the Kyma International Sound Symposium (KISS) for composers and researchers using the Kyma language for their work. This year's theme is "The Sound of Science" and will feature live performances, scientist–composer collaborations, data-sonification workshops, and data-to-sound mapping competitions.

A Walk I Do (2012)—Katharine Norman

Composed for flutist Carla Rees, with support from the Britten-Pears Foundation, "A Walk I Do" was first performed at The Forge in London, in May 2016. Like my other recent works, this piece is a composed work that combines instrumental performance with live audio and text processing. In this case I asked Rees to send me an informal description of a favorite walk, which I used as found material. As in another similar piece, "Paul's Walk," written for clarinetist Paul Roe, the text itself is not as important as the fact that by describing it, a person conveys their relationship to place and the way we relate to our environment through personal memory and experiences.

"A Walk I Do" was made in openFrameworks (visuals) and Pure Data (audio). The final software interface is packaged as a standalone Mac OS application. Although written for specific performers initially, all my recent works are designed to be adaptable to other instrumentation and performable with software that requires minimal technical knowledge.

Track Duration: 10:32

Katharine Norman is an internationally recognized composer of work for instruments and digital resources, often inspired by people's experience of place and landscape. Over the past ten years she has developed a concurrent profile as a writer. Computer programming forms an essential part of her creative work and she is a skilled programmer in a number of areas.

Recent performance works exploring interactive image, text, and sound include "Making Place," commissioned by pianist Kate Halsall; "A Walk I Do," for Carla Rees; and "Paul's Walk," for Paul Roe. "Fuga Interna (Begin)," for piano and digital sound is based on her experience of her mother's battle with Alzheimer disease, and has been performed widely. As a writer, her digital fiction and nonfiction have featured in various festivals, publications, and conferences. Window (for John Cage), an interactive "sound essay," won the 2012 New Media Writing Prize.

Katharine Norman received her PhD in composition from Princeton University, and for some time worked in academia before deciding to find other strategies for continuing as a composer and writer. She spent several years on a small island in Canada, supporting her work through freelance editing and writing, and is currently back in the United Kingdom working part-time in publishing.

Figure 14. Frances White.

Figure 15. Mara Helmuth.

Figure 16. Esther Lamneck.

The Old Rose Reader (2004)—Frances White

"The Old Rose Reader" was inspired by my love of old garden roses. "Old roses" are either species roses that have been grown for many hundreds of years or hybrids that were developed mostly before 1900. Many of them are famous for having been grown in Empress Josephine's garden at Château de Malmaison in France. I love them not only for their exceptional beauty and fragrance, but also for their wonderful, romantic names. All of the names that appear in the text of "The Old Rose Reader" belong to actual roses, some of which I grow in my own garden.

"The Old Rose Reader" was commissioned by, and is dedicated to, Mari Kimura. The text was written by my husband, James Pritchett, who also created the video part. The text was read by Kimura's husband, Hervé Brönnimann. This work was funded in part by the Composer Assistance Program of the American Music Center. A large part of "The Old Rose Reader" was completed while in residence at The Djerassi Resident Artists program.

Track Duration: 16:39

Frances White is known for her works combining live performers and computer-generated electronic sound spaces. Her music conveys intimacy and immediacy, with a deeply expressive approach that derives from a sincere belief in the transformative nature of sound. White studies the shakuhachi and finds that its spiritual and sonic voice informs her work as a composer. A 2004 Guggenheim fellow, White has received awards, grants, residencies and commissions from organizations such as the Fromm Foundation, Prix Ars Electronica, and

the International Computer Music Association.

Most recently, her music was featured in the installation Tracing on the Farther Side at the 2020 Venice Biennale, and by the Momenta Quartet, who commissioned her to write "The Book of Evening," with funding from a New Music USA Project Grant and the Sparkplug Foundation.

White's music can be heard on record labels including Wergo, Centaur, and Ravello, and was featured as part of the soundtrack of three of Gus Van Sant's award-winning films.

Sound Dunes (2019)—Mara Helmuth and Esther Lamneck

"Sound Dunes," for tárogató and stereo fixed media, is the third collaboration composed by both Mara Helmuth (computer music) and Esther Lamneck (tárogató). It was inspired by an exploration of the tárogató sound world and its digital transformations. The piece has resonances with the natural environment such as a sand dune, with its curving contours and granular texture. This piece was premiered at the Diffrazione Multimedia Festival 2019 in Florence.

Track Duration: 8:17

Esther Lamneck, clarinetist and tárogató performer, has appeared

Figure 15

Figure 16

as a soloist with major orchestras, with conductors such as Pierre Boulez, with renowned chamber music artists, at music festivals worldwide, and with an international roster of musicians from the new music improvisation scene. A versatile performer and an advocate of

contemporary music, she is known for her work with electronic media including interactive arts, movement, dance, and improvisation.

She is recognized for her collaborative work with composers on both the clarinet and the tárogató in creating electronic music environments for improvisation. Many of her solo and duo CDs feature improvisation and electronic music, including *Cigar Smoke, Tornado Project*, and *Tárogató Constructions*.

Lamneck is a Professor at New York University (NYU)'s Department of Music and Performing Arts Professions. She is the artistic director of the NYU New Music Ensemble, a flexible improvising group that works in electronic settings using both fixed media and real time sound and video processing.

About the Curator

Mara Helmuth composes music, often involving the computer, and creates multimedia and software for composition and improvisation. Her recordings include *Sound Collaborations* and *Implements of Actuation*, and works included on Esther Lamneck's *Tarogato Constructions* and the *50th Anniversary University of Illinois Experimental Music Studios Commemorative Collection*. Her scores are published in *Open Space Magazine* issues 19–20 and in *Notations 21*, edited by Theresa Sauer. Her music has been performed internationally at conferences, festivals, and arts spaces. Her research includes software for composition and improvisation and has involved virtual reality, granular synthesis, wireless sensor networks, user interfaces, performance over Internet2, and contributions to the RTcmix music programming language. She has initiated compositional collaborations with Esther Lamneck, Rebecca Danard, and Allen Otte, and has completed several computer music installations. She is a Professor of Composition at the College-Conservatory of Music (CCM), University of Cincinnati, Director of the CCM Center for Computer Music, and previously taught at Texas A&M University. She holds a DMA from Columbia University, and earlier degrees from the University of Illinois at Urbana-Champaign. She served on the board of directors for the International Computer Music Association, in several positions including Vice President for Conferences and President.