This is the premiere recording of the magnetic resonator piano, an electronically-augmented acoustic grand piano that uses electromagnets to elicit new sounds from the piano strings.

KINEMATICS

Webster's Dictionary defines *kinematics* as "the branch of mechanics that deals with pure motion, without reference to the masses or forces involved in it." This term borrowed from physics seems like a good match for a piece which is constantly in motion. The violin has always struck me as the most kinetic of instruments, and this piece draws its energy particularly from the bow, with rapid passagework and sharp spiccato strokes. The tone is alternately intense and joyous, while leaving room for lyrical material along the way. As the piece develops, the basic pulse increasingly fluctuates, with steady meters giving way to irregular and shifting groupings before finally settling into a determined sprint at the end.

Kinematics was written for Martin Shultz in 2008; Martin gave the premiere performance on April 24th, 2008 in Baltimore, MD.

D'AMORE

The title *d'Amore* comes from the viola d'amore, a baroque instrument with six or seven bowed strings and an equal number of sympathetic strings. The sympathetic strings are not played by the performer at all but instead resonate sympathetically with the bowed strings, producing a warm tone with natural reverberation. In *d'Amore*, I use the magnetic resonator piano as a giant collection of sympathetic strings: notes played on the viola are sustained and reverberated by the piano strings, leaving behind perpetually-shifting harmonic clouds.

The viola soloist is differentiated from the resonance by an exaggerated vocal style of playing, emphasizing pitch bends, glissandos and microtonal inflections. In a way, this piece can be heard as a struggle between the individuality of the soloist and the mechanized nature of the resonance-- a struggle which always resolves in favor of the soloist.

d'Amore was written for Nadia Sirota in summer 2009 and premiered by her in Philadelphia, PA on November 22nd, 2009.

SECRETS OF ANTIKYTHERA

Secrets of Antikythera takes its inspiration from the Antikythera Mechanism, an ancient mechanical device for plotting the position of the planets in the night sky. Discovered in an ancient shipwreck off the Greek island of Antikythera in the early 20th century, its function was not discovered until decades later. The mechanism is remarkable for its precision and sophistication, the likes of which had never been seen before were not seen again for centuries.

In this piece, I imagine the creator of this device, whose identity will likely never be known. What joys and sorrows must this person have encountered while undertaking such a remarkable project? The prologue attempts to capture the sense of wonder at the night sky that might have inspired the creation of this device. Beginning in the second movement, a simple, slowly spinning melodic idea emerges. In each successive movement, this idea is progressively refined until reaching its final form

RECORDING INFORMATION

All tracks recorded and produced by Ryan Streber at Oktaven Audio, Yonkers, NY. *Kinematics* recorded March 1, 2011; *d'Amore* recorded March 25, 2011; *Secrets of Antikythera* recorded October 25-27, 2011. *d'Amore* and *Secrets of Antikythera* recorded on a Steinway D piano provided by Klavierhaus, New York, NY.

All pieces published by Andrew McPherson Music (ASCAP).

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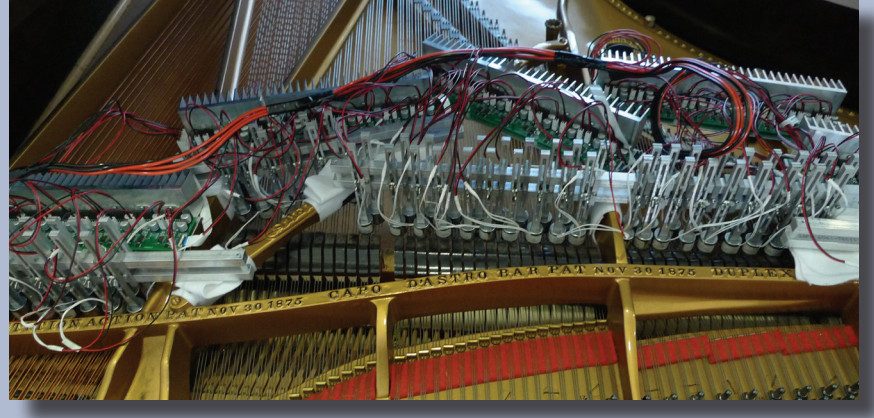


clude infinite sustain, crescendos from silence, pitch bends, harmonics and new timbres, all produced acoustically by the piano strings without any external speakers or amplification. By manipulating the acoustic properties of the piano itself, the MRP acquires the richness and resonance of the piano in which it is installed, including the sympathetic vibrations between the strings.

The musical goal of the magnetic resonator piano is to allow the pianist to continuously shape every note as a violinist might, while maintaining the piano's natural polyphony. To enable this continuous control, an optical sensor strip (based on a modified Moog Piano Bar) is placed on the keyboard which records the continuous position of each key, in contrast to typical MIDI keyboards which record only presses and releases. A laptop computer maps key position data to electromagnet signals, but all musical control is from the keyboard and the performer never interacts with the computer directly.

In *Secrets of Antikythera*, the instrument is configured with two keyboards including a MIDI keyboard placed atop the piano. The main piano keyboard controls both traditional piano sounds and resonators. The top keyboard controls only the resonators; it is used periodically in the piece to produce a different timbre to the main keyboard, or to play extended passages without hammers. The MRP can also be played from a single keyboard, where the continuous motion of the piano keys controls both piano and resonators. *d'Amore* uses the magnetic resonator piano but no pianist. The pedal is held down throughout the piece, and pitch-tracking on the viola is used to selectively resonate strings inside the piano.

In 2011, six composers and three pianists in the Philadelphia area participated in a project to write and perform new music for magnetic resonator piano. The pieces were performed in December 2011 and the results described in an article in Computer Music Journal (vol. 36 no. 4, 2012). Development of the instrument continues at Queen Mary, University of London.

in Movement VIII, "Vision Fulfilled." Finally, the epilogue presents the preceding ideas as they might appear over a vast gap in time: corroded, obscured, with only the bare outlines still distinguishable.

The prologue is played entirely with magnetic resonator sounds; as the piece goes along, the resonators gradually give way to the piano until Movement VIII is played entirely without electronics. Finally, the resonators return in the epilogue, sometimes complementing the traditional piano material, sometimes obscuring it.

Secrets of Antikythera was written in 2009 alongside development of the magnetic resonator piano. The original performances were given by Steven Beck in Philadelphia, PA on November 22nd, 2009 and Sandra Gu in Palo Alto, CA on May 26th, 2010.

Andrew McPherson is a composer, engineer and instrument designer working in the Centre for Digital Music at Queen Mary, University of London. He did his undergraduate work at MIT, studying composition with Peter Child and John Harbison and viola with Marcus Thompson. A double major in music and electrical engineering, he graduated Phi Beta Kappa and was awarded the 2004 Sudler Prize in the Arts. He subsequently worked in Barry Vercoe's computer music group at the MIT Media Lab, completing a Master's degree in engineering in 2005.

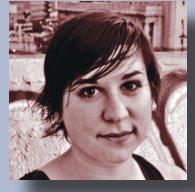
Andrew completed his Ph.D. in music composition at the University of Pennsylvania in 2009, where his teachers included James Primosch, Jay Reise, Anna Weesner, and Maurice Wright. He has attended the Tanglewood, Aspen, Cabrillo, Bowdoin, and N.E.O.N. music festivals, and has won awards including a 2008 Charles Ives Scholarship from the American Academy of Arts and Letters, the 2009 Jacob Druckman Prize from Aspen, the 2009-2010 Symphony in C Young Composer's Competition, and grants from the American Composers Forum and American Music Center. His compositions have been performed by Network for New Music, the Radius Ensemble, the American Composers Orchestra, the Cabrillo Festival Orchestra, the Tanglewood New Fromm Players, the BUTI Wind Ensemble, and the MIT Symphony and Chamber Orchestras, among others.

After the PhD, as the recipient of a Computing Innovation Fellows award from the Computing Research Association and the National Science Foundation, he worked for two years as a postdoctoral researcher at Drexel University in the Music Entertainment Technology laboratory (MET-lab), directed by Youngmoo Kim. In September 2011, he joined Queen Mary, University of London as Lecturer in Digital Media, where he a member of the Centre for Digital Music (C4DM), a

research group within the School of Electronic Engineering and Computer Science. His research interests include electronically-augmented acoustic instruments, new performance interfaces and computational modeling of expressive performance, and he has taught courses ranging from music theory to analog electronic design. More information can be found on his website:

andrewmcpherson.org

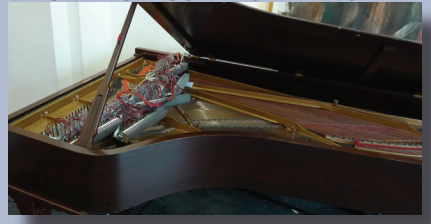
Martin Shultz, violin
Cited by the New York Times for his "assertive" playing, Martin Shultz currently performs in the first violin section of the Bergen Philharmonic in Norway, following two years in the New World Symphony in Miami. He completed his studies at Rice University and the Peabody Conservatory under the tutelage of Sergiu Luca and Pamela Frank, receiving several awards for violin and chamber music. He has also closely collaborated with Jeremy Denk, Michael Kannen, and Maria Lambros, and composers such as John Harbison, Michael Gandolfi, Shulamit Ran, and Ellen Taafe Zwillich. Shultz spent four summers at Tanglewood, where he received the Jules C. Reiner Violin Prize, including two years as a member of the New Fromm Players, an ensemble specializing in contemporary music. He has recently performed with Bit20, a Norwegian new-music ensemble, in the premieres of several new works. Shultz has also participated in the Music Masters Festival of Japan and the Pacific Music Festival, where he served as concertmaster. As a soloist, he has performed with the Peabody Camerata, Tanglewood Music Center Orchestra, and the New World Symphony. Outside of music, Shultz enjoys cooking and long-distance running.



Nadia Sirota, viola
Hailed by the New York Times as "a bold new-music interpreter and the violist of choice among downtown ensembles these days," Nadia Sirota has been praised for her "command and eloquence," (Boston Globe) and for being one of New York's "brightest, busiest players" (Time Out New York). She is best known for her unique interpretations of new scores and for commissioning and premiering works by some of the most talented composers of her generation, including Marcos Balter, Caleb Burhans, Judd Greenstein, Missy Mazzoli, and Nico Muhly. Nadia's solo record, First Things First, was a New York Times 2009 record of the year. In addition to performing, Nadia teaches at the Manhattan School of Music, in the Contemporary Performance Program, as well as hosts a weekday radio show devoted to contemporary music on WQXR's internet radio stream Q2. Winner of the 2010 ASCAP Deems Taylor award in radio and internet broadcasting, Nadia's show was recently described by Alex Ross (The Rest is Noise, The New Yorker) as "radio we can believe in."

Ryan MacEvoy McCullough, piano
Born in Boston and raised near the coastal redwoods of northern California, pianist Ryan MacEvoy McCullough has appeared as concerto soloist with orchestras including the Los Angeles Philharmonic, Sarasota Festival Orchestra, World Festival Orchestra, Orange County Wind Symphony, and Colburn Conservatory Orchestra, and has performed with eighth blackbird and the Mark Morris Dance Group. He has worked closely with composers John Harbison, Andrew McPherson, and Carter Pann, and has commissioned or been dedicatee of works by James Primosch, John Liberatore, Shawn Allison, and Dante De Silva. In 2008, McCullough released a CD of solo piano music by 20th century Polish-French composer Miłosz Magin on the Polish label Acte Prealable. In 2011, McCullough was awarded the Henry Kohn Memorial Award from the Tanglewood Music Center, where he first collaborated with Andrew McPherson in 2010. He has won prizes at the Milosz Magin Piano Competition, World Piano Competition, Virginia Waring International Piano Competition, and Bronislaw Kaper awards, and was recipient of the 2011 Outstanding Graduate Award from the University of Southern California's Thornton School of Music. McCullough has studied primarily with John Perry and Deborah Clasquin.

ABOUT THE MAGNETIC RESONATOR PIANO



The magnetic resonator piano (MRP) is an electronically-augmented acoustic grand piano using electromagnets to extend the expressive capabilities of the traditional piano. Historically, the piano has been a discrete instrument: key presses cause hammers to strike the strings, and once a note has been struck, the performer has no further ability to control its sound before it is released.

The MRP places 88 electromagnets inside the piano (one for each note), with the magnets suspended a short distance above the strings. Running a time-varying electrical current through the magnet causes the string begin vibrating without ever having been struck by the hammer. By varying the waveforms sent to the magnets, a wide variety of musical effects are possible. New sounds in-