UMS PRESENTS

SUPERPOSITION

Concept, direction, and music by
Ryoji Ikeda

Friday Evening, October 31, 2014 at 8:00
Saturday Evening, November 1, 2014 at 8:00
Power Center • Ann Arbor

11th and 12th Performances of the 136th Annual Season
International Theater Series

Photo: superposition, 2012; photographer: ©Kazuo Fukunaga/Kyoto Experiment in Kyoto Art Theater, Shunjuza.
CREATIVE TEAM

Concept, Direction, and Music  
Ryoji Ikeda

Optical Devices  
Norimichi Hirakawa

Performers
Stéphane Garin
Amélie Grould

Stage Manager  
Simon MacColl

Programming, Graphics, and Computer System  
Tomonaga Tokuyama
Norimichi Hirakawa
Yoshito Onishi

Technical Manager  
Tomonaga Tokuyama

Production Assistant  
Daisuke Sekine

PROGRAM

superposition is approximately 65 minutes in duration and will be performed without intermission.

These performances are supported by the Renegade Ventures Fund, established by Maxine and Stuart Frankel.

Endowment support provided by the Doris Duke Charitable Foundation Endowment Fund.

Funded in part by the Japan Foundation through the Performing Arts JAPAN program.

Media partnership is provided by WDET 101.9 FM.

Special thanks to Fred Adams, Myron Campbell, Carol Rabuck, and the U-M Saturday Morning Physics Program; Chrissitna Hamilton and the U-M Penny W. Stamps Distinguished Speaker Series; and Justin Joque for their participation in events surrounding the performances of superposition.
The new project superposition explores a new notion of information: quantum information.

The language of classical information is BIT (binary digits) — 0 or 1, which is the most fundamental building block of our judgment and logical thoughts.

The language of quantum information is QUBIT (quantum binary digits) — 0 and 1 superposed at the same time, which is a new way for us to capture the truth of nature at an extremely small sub-atomic scale — such as behaviors of photons or electrons.

When we try to observe a sub-atomic particle we cannot know both its position and its speed at the same time. Once we observe the position, we understand the information of the position but lose that of the speed. Before we observed the position, the single sub-atomic particle was actually located at all possible positions simultaneously, which is the so-called “superposition state”.

In short, our observation fixes the position. It is unbelievably counterintuitive and is beyond our human comprehension. No one can know the very nature of nature. On such an extremely small scale, we can know only a single value of a single parameter from the infinite facets of nature.

BIT is digital. QUBIT is analog — analogous to nature. BIT is discrete, QUBIT is continuous — a continuum. Quantum computing is to read how sub-atomic particles behave by means of the language of QUBIT; i.e. Nature computes. We decipher it.

Nature is always here and there. We forcefully try to understand and demystify the nature of nature by means of our scientific knowledge, but we’re also part of nature, nature is unthinkably vast — from an atom to the universe. Some esoteric codes will remain secret and beyond human comprehension, perhaps forever.

superposition is inspired by all these thoughts and is foolhardily and quixotically aiming to explore the new kind of information through art.

— Ryoji Ikeda

Quantum superposition is a principle of quantum theory that describes a challenging concept about the nature and behavior of matter and forces at the sub-atomic level. The principle of superposition claims that while we do not know what the state of any object is, it is actually in all possible states simultaneously. According to Erwin’s Schrödinger equation, which is linear, a solution that takes into account all possible states will be a linear combination of the solutions for each individual state.

The principle of superposition claims that if the world can be in any configuration, i.e. any possible arrangement of particles or fields, but can also be in another configuration, then the world can be found in a state of superposition of the two configurations, where the amount of each configuration in the superposition is specified by a complex number.

Quantum computing enables us to understand the quantum behaviors of nature on an atomic scale. The language of quantum computing is Quantum Bit = Qubit. Bit is the basic unit of information in computing and telecommunications information. Bit equals 0 or 1, true or false, on or off.

In quantum computing, a quantum bit is a quantum system that can exist in superposition of two bit values.
0 and 1, true and false, on and off. Once we measure the position or speed of an atomic particle, all superposed states are reduced to a specific state. In other words, one cannot assign exact simultaneous values to the position and speed of an atomic particle. This is called the Uncertainty Principle. Quantum computing uses this principle alongside quantum entanglement and superposition.

After almost a decade of research on the discrete and the continuous, mathematical beauty and sublimation, Ryoji Ikeda has finally found a space where all mathematical concepts find an explanation in the notion of qubit, an infinite grey area between 0 and 1 in which probability and uncertainty coexist. As opposed to the arithmetical continuum of real numbers, the grey area of qubit expands to the notion of complex projective line in projective geometry. (In quantum mechanics, the Bloch sphere is a geometrical representation of the pure state space of a two-level quantum mechanical system. The points on the surface of the sphere represent the pure states of a single qubit, the interior of the sphere represents the mixed states.)

**ARTISTS**

Japan’s leading electronic composer and visual artist **RYOJI IKEDA** (concept, direction, music) focuses on the essential characteristics of sound itself and that of visuals as light by means of both mathematical precision and mathematical aesthetics. Born in Gifu, Japan and now living and working in Paris, Mr. Ikeda has gained a reputation as one of the few international artists working convincingly across both visual and sonic media. He elaborately orchestrates sound, visuals, materials, physical phenomena, and mathematical notions into immersive live performances and installations.

Alongside of pure musical activity, Mr. Ikeda has been working on several long-term projects: **datamatics** (2006–present) consists of various forms such as moving image, sculptural, sound, and new media works that explore one’s potentials to perceive the invisible multi-substance of data that permeates our world. The project test pattern (2008–present) has developed a system that converts any type of data — text, sounds, photos, and movies into barcode patterns and binary patterns of 0s and 1s, which examines the relationship between critical points of device performance and the threshold of human perception. The series **spectra** (2001–present) is large-scale installations employing intense white light as a sculptural material and so transforming public locations in Amsterdam, Paris, Barcelona, and Nagoya where versions have been installed. Mr. Ikeda works on a collaborative project with Carsten Nicolai entitled **cyclo**. (2000–present), which examines error structures and repetitive loops in software and computer programmed music, with audiovisual modules for real-time sound visualization, through live performance, CDs, and books (Raster-Noton, 2001, 2011).

Mr. Ikeda has performed and exhibited worldwide at venues including the Australian Centre for the Moving Image, Melbourne; MIT, Boston; Centre Pompidou, Paris; Sónar Festival Barcelona; Tate...
Modern, London; Irish Museum of Modern Art, Dublin; Auditorium Parco della Musica, Roma; ICC, Tokyo; Art Beijing; Göteborg Biennale; Elektra Festival Montreal; Le Fresnoy, Tourcoing; Yamaguchi Center for Arts and Media; Le Laboratoire, Paris; Museum of Contemporary Art Tokyo; Ikon Gallery, Birmingham; Singapore Art Museum; Crossing the Line Festival, New York; Ars Electronica Center, Linz; Grec Festival, Barcelona; Aichi Triennale, Nagoya; Palazzo Grassi, Venezia; Armory Park Avenue, New York; Barbican Center, London; Museo de Arte, Bogota; Hamburger Bahnhof, Berlin; Laboral, Gijon; Festival d’Automne, Paris; as well as electronic music festivals and small DJ clubs.


STÉPHANE GARIN (performer) has performed with groups including Ensemble Intercontemporain (EIC), Les Siècles Orchestre, and the Brussels Philharmonic, under conductors including Pierre Boulez, Péter Eötvös, and François-Xavier Roth, and with musicians, dancers, performers, and directors including Pascal Battus, Olivier Bernet (recording of the soundtrack of the film Persepolis), Carl Craig, Pascal Comelade, Mathias Delplanque, Pierre-Yves Macé, Stephan Mathieu, Thierry Madiot, Moritz von Oswald (of Basic Channel), Shua Group (Giant Place Detail installation and performance project, Winter Garden, World Financial Center, New York).

He is the founder of the collective “0” (pronounced zero) with Sylvain Chauveau and Joël Merah, and is also a member of Dedalus, an ensemble of contemporary music conducted by Didier Aschour. His phonography works including Gurs, Drancy, Gare de Bobigny, Auschwitz, Birkenau, Chelmno-Kulmhof, Majdanek, Sobibor, and Treblinka. Since 2005, he has been working in collaboration with the visual artist Sylvestre Gobart on an artistic work on the memory of extermination during World War II (France, Poland, Ukraine). It presents recent pictures (photography and video) and audio recordings taken on the very grounds of internment, deportation, and extermination. This work was presented as an installation at Biarritz Multimedia Library and at Sol Del Rio Arte Contemporanea Gallery in Guatemala.

AMÉLIE GROULD (performer) began studying flute at the age of six at the Val Maubuée music school and then began learning percussion nine years later with Beatrice Répécaud and Jean Geoffroy. She received three high distinctions in 2006 for music analysis, chamber music, and percussion. At the same time she studied music history, piano and jazz (drums). She continued her musical studies in Rueil-Malmaison, where she studied under Éve Payeur (with high distinction in 2007) and specialized in contemporary music and musical theater. To promote those music styles, she created the Trio Troïka with two other percussionists, Rose Devas and Bénédicte Albanhac.

She is an accomplished chamber musician, having collaborated with Ivo Malec, Yann Maresz, Philippe Hurel, Bruno Giner, François Paris, Martin Matalon, Thierry De Mey, and Philippe Leroux. She plays in several orchestras and ensembles such as Court Circuit, Arcema, and Ensemble 2e2m.

While teaching at the Havre music school is very important to her, she also works with the dancer Céline Quédeville, performs with theater company Théâtre de l’Impossible, plays Thirteen Drums (Maki Ishii) with a contemporary dance class at
the Val Maubuée music school, plays with the saxophonist Safia Azzoug, and plays with AUM Grand Ensemble. She has performed in superposition since 2012.

TOMONAGA TOKUYAMA (programming, graphics, computer system, technical manager) graduated from Kyoto University and went on a scholarship with FABRICA, Benetton’s Communications Research Center. He works internationally in the fields of audiovisual art, architecture, info-graphics, and programming. Mr. Tokuyama has worked with architects such as Kengo Kuma and Junya Ishigami in designing and developing software. He was nominated for the Iakov Chernikhov Prize in 2010 for his contributions to architecture. Since 2009, Mr. Tokuyama has been based in Paris and works for Ryoji Ikeda’s installation and concert pieces. He has played in audiovisual concerts in collaboration with Takeshi Kurosawa (Sora) and took part in group shows alongside Arata Isozaki’s exhibition in the Venice Biennale in 2012.

YOSHITO ONISHI (programming, graphics, computer system) is a graduate of Tama Art University. He specializes in minute procedural paintings and sculptures using coding, software, and devices. He also makes experimental movies using virtual worlds (for example, a sandbox) and works alongside many artists as a software/hardware developer, a moviemaker, and a designer.

NORIMICHI HIRAKAWA’s (programming, graphics, computer system, optical devices) work is focused on real-time processed and computer programmed audio visual installations and has been shown at national and international art exhibitions as well as media art festivals. Mr. Hirakawa has received many awards including the Excellence Prize at the Japan Media Art Festival in 2004 and the Award of Distinction at Prix Ars Electronica in 2008. Involved in a wide range of activities, he has worked on a concert piece production with Ryoji Ikeda; collaborated with Yoshihide Otomo, Yuki Kimura, and Benedict Drew; participated in the Lexus Art Exhibition at Milan Design week; and done live performances with Typingmonkeys.

After graduating from the Ecole Spéciale d’Architecture in 2012, DAISUKE SEKINE (production assistant) founded ARCHIEE, an international architecture research and design unit in Paris, France. Before setting up his practice, he collaborated with Dorell.Ghotmeh.Tane/Architects in Paris and Tamon in Tokyo. In his work, he often works alongside interdisciplinary profiles (artist, scientist, social scientist, philosopher, etc.) to extend his architectural domain. His practice ARCHIEE was awarded “Prix Speciale” in winter 2011.

UMS welcomes Ryoji Ikeda and the superposition company as they make their UMS debuts this weekend.
Production Credits

**Ryoji Ikeda Studio**
Emmanuelle de Montgazon, Artistic Direction
Yuko Higaki, Administration

**Quaternaire**
Sarah Ford, Producer and Artist Management
Laurie Uprichard, Associate Producer
Kathleen Aleton, Administration
Joanna Rieussec, Coordination and Marketing

**Forma**
David Metcalfe, Artistic Director

World Premiere: November 14–16, 2012 at the Centre Pompidou with the Festival d’Automne in Paris, France. Avant-Première on August 5, 2012 at ZKM in Karlsruhe, Germany. Music commissioned by Festival d’Automne in Paris, France. Created and developed at Parc de La Villette in Paris, France, Yamaguchi Center for Arts and Media in Japan, and ZKM in Karlsruhe, Germany.

Co-producers: Festival d’Automne (Paris, France), Les Spectacles Vivants — Centre Pompidou (Paris, France), Barbican (London, United Kingdom), Concertgebouw Brugge (Bruges, Belgium), Festival de Marseille Danse et Arts Multiples (France), Parc de La Villette (Paris, France), Kyoto Experiment (Japan), ZKM (Karlsruhe, Germany), STRP Art and Technology Festival (Eindhoven, Netherlands), and Stereolux/Festival Scopitone/le lieu unique (Nantes, France). Created with the support of the DICRéAM-CNC (France).

Scan for an interview! Data as Playful: on Ryoji Ikeda, visual and sound data, and tapestries that access the sublime.

Download a free QR code reader app on your smart phone, point your camera at the code, and scan to see multimedia content; or visit www.umslobby.org to find these stories.