

PHSColograms

Ellen Sandor & (art)ⁿ

Photographies Virtuelles



Olivier R Bijon Gallery
July 1 - July 21, 2019

Olivier R Bijon Gallery

Presents

**An Exhibition of PHSCologram Sculptures and
Virtual Reality Experience**

Opening Reception: July 1, 4 p.m.

Dès notre première rencontre au (art)ⁿ studio de Chicago, Madame Ellen Sandor nous a parlé de l'avenir de la photographie avec une passion inhabituelle.

Ellen Sandor est une artiste des nouveaux médias et fondatrice / directrice du groupe d'artistes collaboratifs (art)ⁿ. En 1975, Mme, Sandor devient titulaire d'une maîtrise en sculpture de l'École de L'Institut d'Art de Chicago. Étudiante notre artiste s'inspire de la photographie, la sculpture, la vidéo, ainsi que de la nature spirituelle de Outsider Art. Au début des années 1980, Mme. Sandor avait la vision d'intégrer ces multiples formes d'art à l'infographie ce qui donne naissance à un nouveau support appelé PHSColograms, des photographies et des sculptures générées par ordinateur sur écran barrière 3D.

En 2014, Ellen Sandor devient titulaire d'un Doctorat honorifique section Beaux-Arts de l'École de L'Institut d'Art de Chicago. Nommée artiste en résidence au Laboratoire Fermilab pour l'année 2016; en 2017, le *Bulletin Atomic Scientists* lui a rendu hommage pour son engagement de longue date dans l'intégration de l'art et de la science.

PHSCologram (prononcé skol-o-gramme) est un acronyme pour les nouveaux médias qui désigne la photographie, l'holographie, la sculpture et l'infographie. Un certain nombre de vues rendues d'une scène virtuelle sont entrelacées numériquement, dans lesquelles la première ligne de chaque image est combinée à la première ligne correspondante, et ainsi de suite jusqu'à ce qu'une image unique recombinaison soit créée. Ce flou d'images en une seule pièce est relié à un écran de lignes - un film noir avec des lignes claires correspondantes apposées sur un morceau de plexiglas et permet au spectateur d'interpréter la photo numérique en tant qu'objet sculptural grâce à son éclairage rétroactif. Le procédé PHSCologram est breveté et a été autorisé par Picker International et 3M.

De Frank Gehry à Mies van der Rohe en passant par Frank Lloyd Wright, le monde architectural d'Ellen Sandor et (art)ⁿ nous fait voler dans l'espace. De la grandeur architecturale à notre monde subatomique infiniment petit, notre artiste ne fait qu'un pas. Ces œuvres immersives nous invitent à pénétrer dans son monde visible et invisible avec une attention toute particulière du détail et une énergie débordante.

C'est un grand plaisir d'inaugurer ma Galerie Arlésienne avec une célébrité du Midwest des Etats-Unis où j'ai passé ces dernières années. De mon premier magasin d'antiquité dans le Sud de la Drome, un passage a Paris, le Canada puis les Etats Unis avec des nombreux salons prestigieux d'antiquitaires: c'est un grand retour après 23 ans a l'étranger. J'imagine que la couleur et la saveur Provençale me taquinaient. La Galerie Olivier R. Bijon présentera des expositions de photographes, de céramistes, de peintres mais également de meubles et d'objets de décoration. Mais avant tout honneur aux photographes durant les Rencontres de la Photographie. Avec un grand merci à Ellen Sandor, son mari Richard Sandor et (art)ⁿ.

Bien a vous,
Olivier Bijon

Events

New Media Futures: The Rise of Women in the Digital Arts

Edited by Donna J. Cox, Ellen Sandor and Janine Fron
University of Illinois Press

Limited Book signing: July 2, 4 p.m. at Olivier R Bijon Gallery

GALERIE OLIVIER R BIJON

22 RUE DE LA REPUBLIQUE, ARLES, FRANCE

“Art Saves. Tough Art and Science Really SAVES.”

Ellen Sandor

Inspired by the process oriented works of Man Ray and Marcel Duchamp and intrigued by the spiritual nature of Outsider Art, Ellen Sandor had the vision to invent a precursory medium to Virtual Reality and the Virtual Reality CAVE that fuses photography, holography, and sculpture with computer graphics. Sandor coined this new form of expression PHSColograms (skol-o-grams), which are 3D barrier-screen computer-generated photographs and sculptures.

During the 1980s, a growing renaissance within the Chicago art scene was significantly catalyzed through faculty and alumni from the University of Illinois at Chicago and the School of the Art Institute of Chicago, which included Ellen Sandor who was a MFA graduate. In 1982, she produced one of the first unique, large-scale, three-dimensional backlit photographic immersive environments. A private collector commissioned this precursory virtual-reality-like artwork that had been created with a room-sized film camera in a garage-art studio. The immersive installation combined photography and sculpture with the visual illusion of holography without lasers. This complexity of media required collaboration across disciplines with artists, technologists, and thinkers who shared her enthusiasm. From the success of this endeavor, Sandor formed an artists' collaboratory she called (art)ⁿ, membered with SAIC peers and faculty. With (art)ⁿ, Sandor assumed the dual role of artist and producer/director to lead her own 'Renaissance Team,' a term coined by Donna Cox in the mid-1980s.

Sandor's first (art)ⁿ installation was called 'PHSCologram '83' and featured tributes to five innovative artists: Georgia O'Keeffe, Man Ray, Marcel Duchamp, and Louise Nevelson—with the fifth being the Outsider, Intuitive, and Naïve artists. This public installation was an early example of a virtual reality environment assembled within an artistic context. It opened a dialog with others working to combine emerging technologies with traditional art forms. The avant-garde installation caught the attention of the arts community and was reviewed on the front page of the *New Art Examiner* as a historic breakthrough for its original form, process, and approach.

Reconstructing, deconstructing and referencing works by artists continues to be an evocative theme that Sandor and (art)ⁿ recently explored in several Virtual Photography/PHSColograms, virtual sculptures, and Virtual Reality installations. These works were influenced by provocative

artists who have a special relationship to French culture, such as Man Ray, Francis Picabia, Auguste Rodin, and Victor Vasarely. These artists are especially recognized for experimenting with multiple art forms from painting, drawing and sculpture to film and mixed media. Their collective works are progeny for new media artists, and in many ways, their early experiments can be considered precursory to the virtual world.

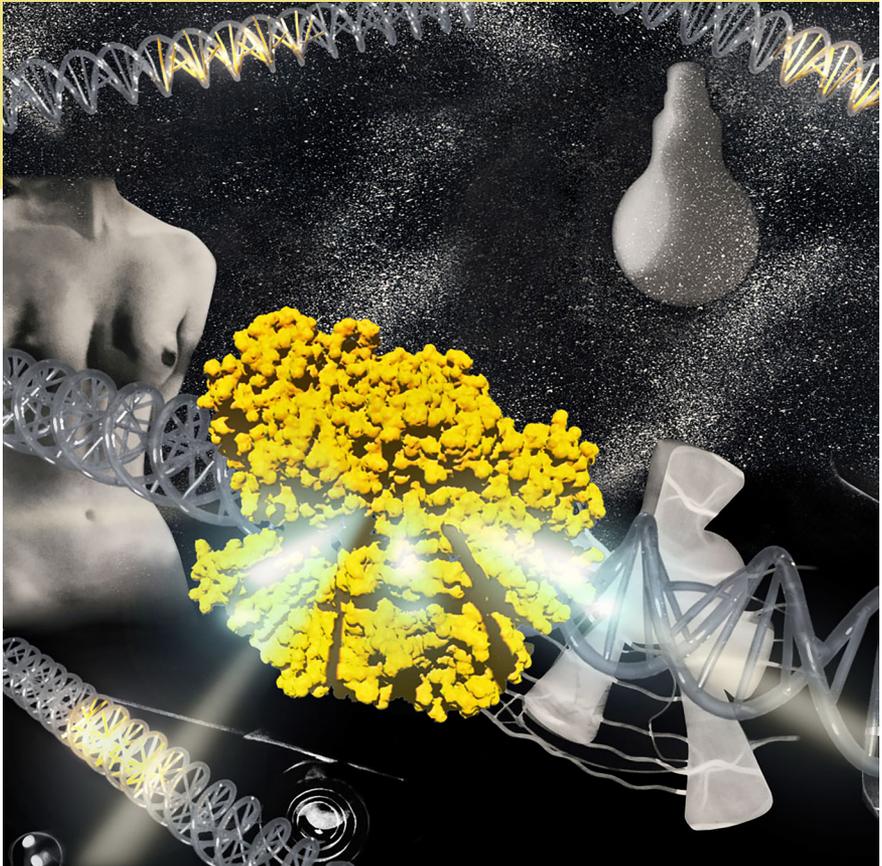


Ellen Sandor with the garage-art camera and stage set for real-time objects that were used as three-dimensional imagery for PHSColograms, Chicago, IL, 1983.

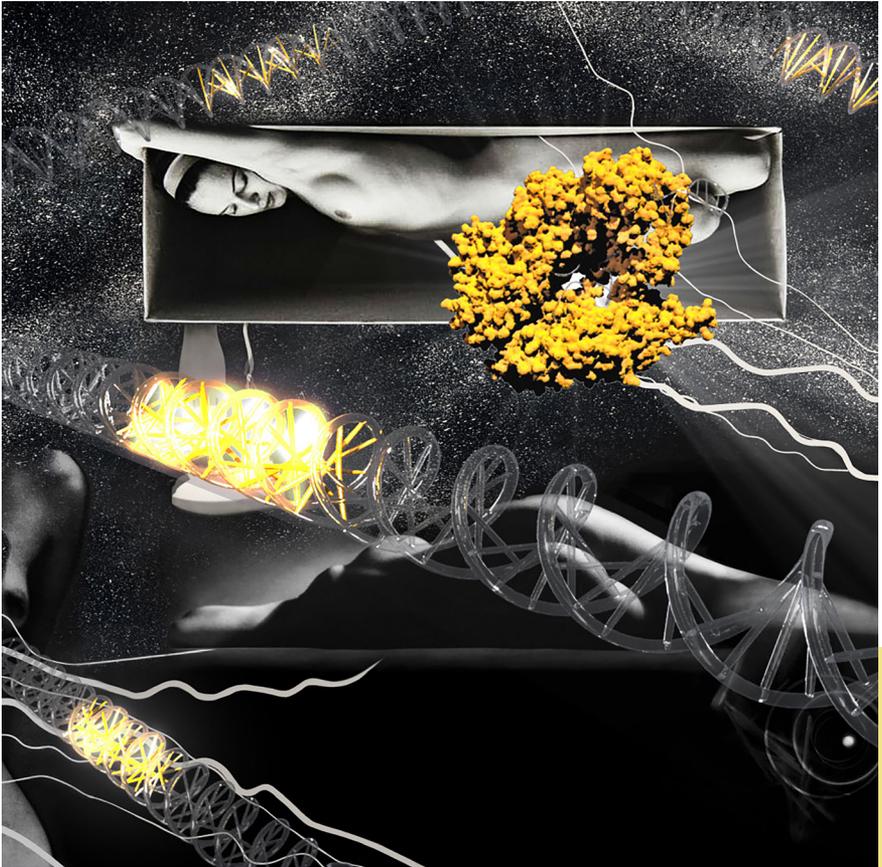
Visualizing the Invisible

“The story of CRISPR is a reminder that breakthroughs can come from unexpected places and that it’s important to let a desire to understand nature dictate the path forward. But it’s also a reminder that scientists and laypeople alike bear a tremendous responsibility for the scientific process and its outputs. We must continue to support new findings in all areas of science, and we must wholeheartedly embrace and diligently exercise our stewardship over these discoveries. For, as history makes clear, just because we are not ready for scientific progress does not mean it won’t happen. Every time we unlock one of nature’s secrets, it signals the end of one experiment - and the beginning of many others.”

—Jennifer A Doudna and Samuel H. Sternberg, *A Crack in Creation: Gene Editing and the Unthinkable Power to Control Evolution*.



CRISPR-Cas9 (*A Ray of Light*)², Panel 1, 2018, 30 x 30 inches



CRISPR-Cas9 (A Ray of Light)2, Panel 2, 2018, 30 x 30 inches

Art is a beacon for communicating and re-presenting scientific discoveries in an illuminating way that can touch the human spirit. The inherent scientific nature of this seminal work is key to stirring a cultural dialogue in which art can engage viewers with current scientific research endeavors. This unique, virtual experience features groundbreaking scientific processes paired with artistic practices that were done with Man Ray's rayograms experimenting with light. Here viewers directly experience art intersecting science, thereby catalyzing a dynamic language that invites a wider audience to contemplate this new frontier and consider its array of possibilities.

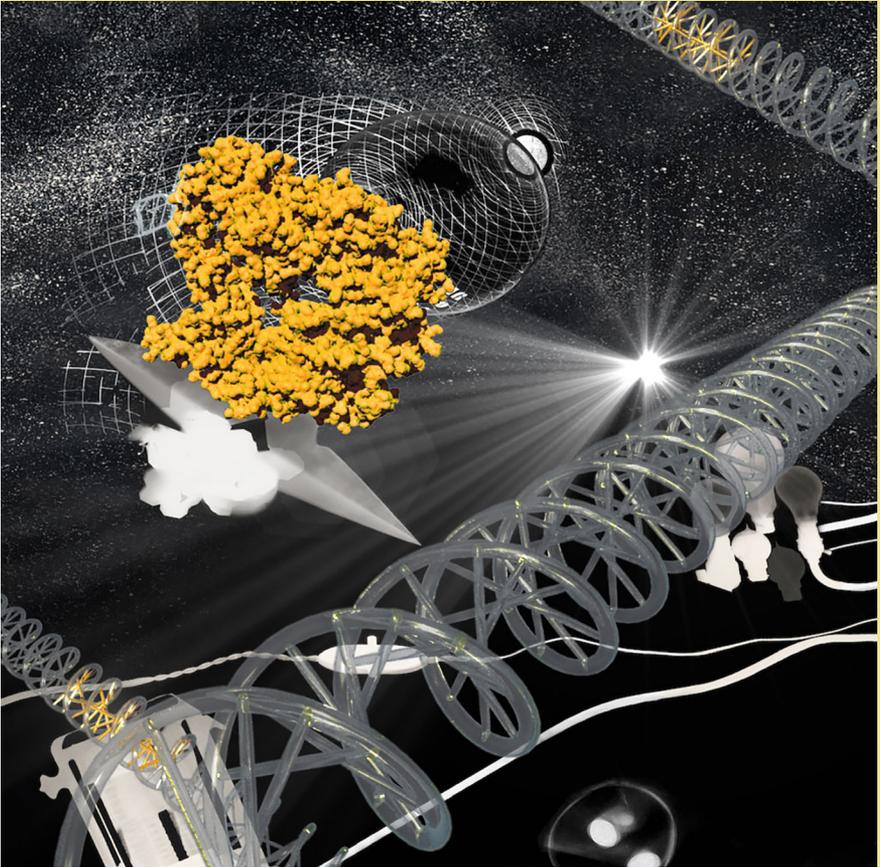
Like the title of this piece, *CRISPR-Cas9 (A Ray of Light)*² the imagery conveys a ray of light, hope and positivity for Cal, and many other heroes and heroines of this new scientific age. This unique collaboration between Ellen Sandor, (art)ⁿ Lab and the Doudna Lab at University of California, Berkeley, engages participants with the intersection of art and cutting edge bio science. Sandor and (art)ⁿ collaborated with the Doudna Lab for nearly a year, which resulted in two immersive PHSCologram sculptures and a Virtual Reality piece.

*CRISPR-Cas9 (A Ray of Light)*², 2018 challenges viewers to consciously participate in the current debate of gene editing. The controversial and significant scientific discovery of CRISPR-Cas9 has reached a critical tipping point where there is a growing disconnection between scientific research and its impact on our society. To bridge this gap, Sandor and (art)ⁿ decoded science into a visual narrative that speaks to our collective consciousness with a compassionate nature to better understand this important discovery.

*CRISPR-Cas9 (A Ray of Light)*² was inspired by Sandor's grandson, Caleb Sandor Taub, who has a severe autism disorder. Cal who's non-verbal, was able to communicate with Sandor for the first time at the age of 18 using the RPM method. He explained how he personally researched the potential of gene editing to learn more about possible cures for autism. He then shared his exciting discoveries through nonverbal RPM about the promising gene-editing capability of CRISPR-Cas9, how it could transform his life and others born with different disorders and become what he calls "a ray of light". In these works, CRISPR-Cas9 is juxtaposed with imagery by Man Ray and Ruth Bernhard, fusing the visible with the invisible-as an illumined pathway towards a future filled with light.

(art)ⁿ's collaboration with the Doudna Lab shows different stages of CRISPR-Cas9 scientists explored to edit harmful genetic mutations. First, the RNA-guided Cas9 protein searches for its matching DNA target. Next, the guide RNA pairs with one strand of the target DNA, and then Cas9 cuts both strands. Finally, the cell's repair machinery seals up the break by patching in a stretch of healthy DNA.

CRISPR-Cas9 is juxtaposed with *Nude in box-reclining*, 1962, Ruth Bernhard, 6 x 13 3/4 inches Vintage silver print; *Sand Dune Nude*, 1967, Ruth Bernhard, 5 1/4 x 13 inches Vintage gelatin silver print; *Electricite. Dix Rayogrammes de Man Ray et un Texte de Pierre Bost*, 1931, Man Ray, 10 Vintage gelatin silver prints, from the Richard and Ellen Sandor Family Collection.



CRISPR-Cas9 (A Ray of Light)2, Panel 3, 2018

Ellen Sandor and (art)'s: Diana Torres, Azadeh Gholizadeh

Jennifer Doudna, The Doudna Lab: RNA Biology, University of California, Berkeley;

Megan Hochstrasser, Innovative Genomics Institute, University of California, Berkeley

Code by William Robertson, DiMoDA

Inspired by Caleb Sandor Taub

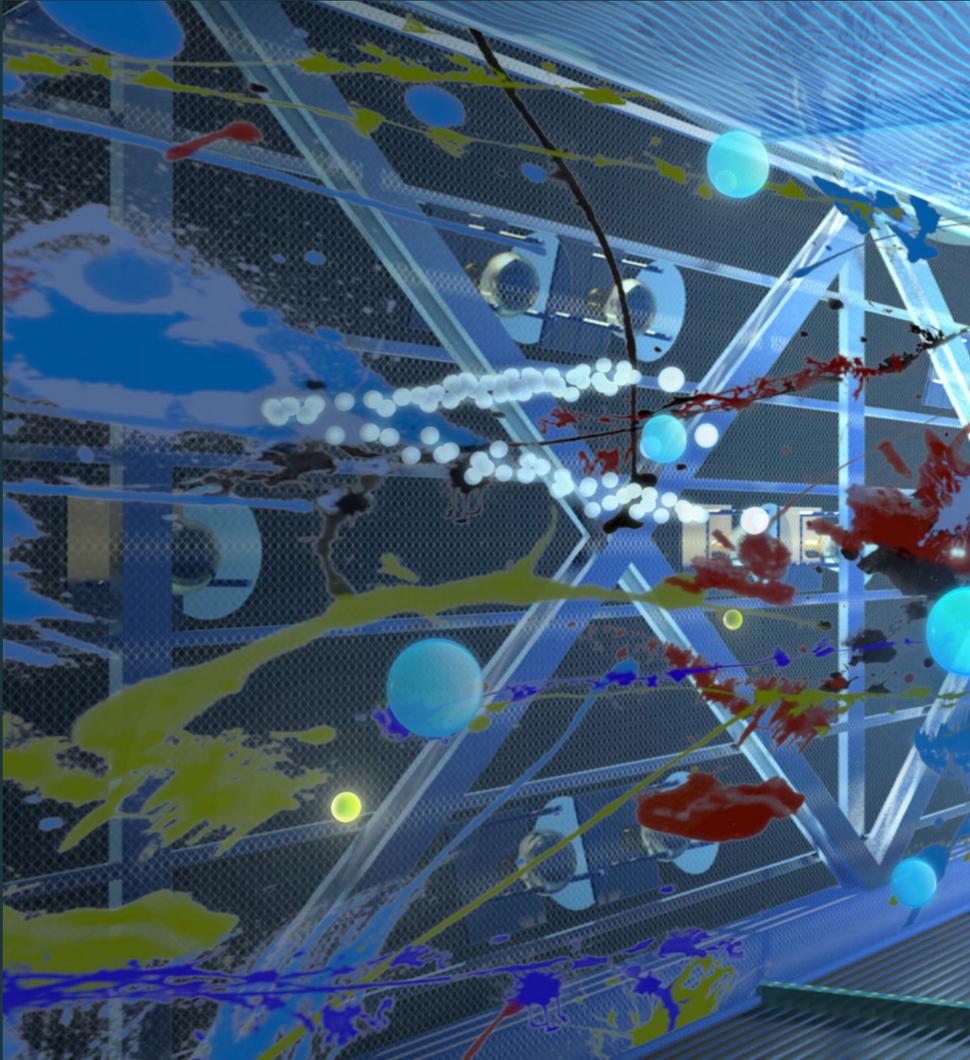
Virtual Photograph/Digital PHSCologram Details: Duratrans, Kodalth, Plexiglas

30 x 30 inches

Fermilab Residency, 2016

“Creativity is a common thread essential to artists and scientists. Reflected in drawings on blackboards or renderings in sketchbooks, the visualization of information is important to reach scientific and artistic goals.

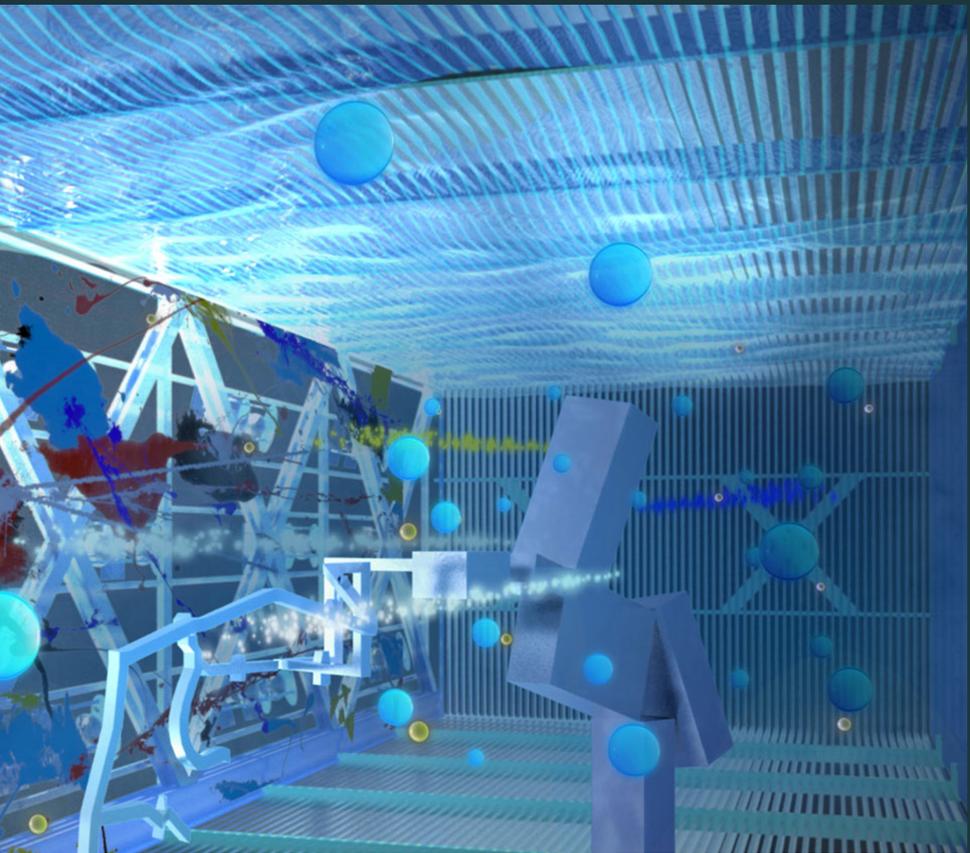
It is a great honor to have Ellen Sandor, a Chicago new media artist and director of (art)”, as the 2016 Fermilab artist-in-residence. Her



energy, enthusiasm and curiosity are rooted in her ability to combine art and science using state-of-the-art technologies. She values the alliance between artist and scientist and finds discovery to be at the forefront of the digital age. Her ability to visualize the invisible—from viruses to subatomic particles—made her the perfect candidate, and her innovative artwork speaks for itself.”

—Georgia Schwender

Founder of the Artist-in-Residence program at Fermilab



The Magnificent MicroBooNE: Science Through the Art of Jackson Pollock and David Smith, 2016

Ellen Sandor and (art)’: Diana Torres, Chris Kemp

Jennifer Raaf, Sam Zeller, Thomas Junk and Fermi National Accelerator Laboratory

Special Thanks to Janine Fron

Digital PHSCologram, Duratrans, Kodolith, and Plexiglas, 24 x 40 inches and Virtual Reality

The Magnificent MicroBooNE: Science Through the Art of Jackson Pollock and David Smith

The MicroBooNE particle detector resides inside a closed chamber (about the size of a school bus) filled entirely with liquid argon. Neutrinos are constantly being shot through the chamber and on occasion they will collide with an argon nucleus. The collision sometimes causes the argon nucleus to break up and at other times the nucleus remains intact, but in both cases the aftermath of the collision results in protons, neutrons, and other particles being expelled, sending them flying out from the collision point. The exiting particles leave trails of charge behind them as they pass through the detector, and these trails of charge are the way that scientists identify what type of interaction the neutrino had with the argon nucleus. A strong electric field is used to push the charged streams toward one side of the detector, which is instrumented with delicate wires arranged in a grid-like pattern that can sense the charge. Light is also created as the exiting particles travel through the liquid, and it is recorded by light-sensitive detectors situated behind the charge-sensing planes of wires.

Both the light and the charge are important in understanding the details of the neutrino interactions. Data from the charge-sensing wires are displayed as a two-dimensional graph showing the path and the activity of particles exiting the neutrino interaction. Multiple views of the two-dimensional plane allow scientists to create three-dimensional graphs that are used to interpret the data. These graphs are color-coded and can be quite beautiful and reminiscent of abstract art.

The Magnificent MicroBooNE, Virtual Reality

With the (art)ⁿ MicroBooNE VR, the recorded charge of the outgoing particles is replaced with colorful drawn lines and painted strokes in a Jackson Pollock style, as well as constructed sculpture in the style of David Smith's Giacometti-inspired work. Both the Pollock painted brush strokes and the Smith sculptures are built up in relation to the course of the particles, illustrating their paths both two-dimensionally and three-dimensionally, while elaborating on the artful presentation of the scientific data and honoring the style of these influential presences in art history.

Jackson Pollock was an American born painter renowned for his role as one of the premier artists of the Abstract Expressionist movement of the 1940s. He is best known for his wild and resonate drip paintings, which

Pollock created by dripping, pouring, and splattering resin-based paints onto large floor-lying canvasses in a process called action painting. This method of painting was just as much about the physical act of painting a work as it was about the final image. (art)ⁿ uses Jackson Pollock's unique drip painting style to artistically demonstrate the 2-dimensional graphs Fermilab researchers acquire from the charge-sensing wires inside MicroBooNE. In the same way Pollock's paint drips record his own movements of his action painting process, MicroBooNE data graphs illustrate the paths and the activities of the charged particles exiting the neutrino interaction.

Like Pollock, David Smith was also an American born artist who worked primarily in seclusion while expressing emotions in his work through strictly abstract ways. Combining influences of European Modernism including Cubism, Surrealism, and Constructivism, Smith is noted for essentially translating the painterly concerns of the Abstract Expressionist movement into sculpture. Traditional metal sculpture and casts required premeditation and design but Smith built his sculpture in the moment, welding metal pieces together in whatever form he currently desired. Smith considered himself more a painter than sculptor, considering his method of work. Later Smith began exploring stainless steel sculpture with burnished textures added through sanding and his work evolved into much more minimalistic art. In the end he was known along with his fellow artist of the times Alberto Giacometti, as one of the greatest sculptors of the era. (art)ⁿ uses an evolution of David Smith's various sculpture work to artistically demonstrate the three-dimensional data graphs Fermilab researchers gain from analyzing multiple views of the two-dimensional planes. In the same way Smith's sculptures became more minimal over time, the three-dimensional data is interpreted from the existing two-dimensional so it's less detailed than its Jackson Pollock implied predecessor.

Neutrinos and NOvA: A Vasarely Variation

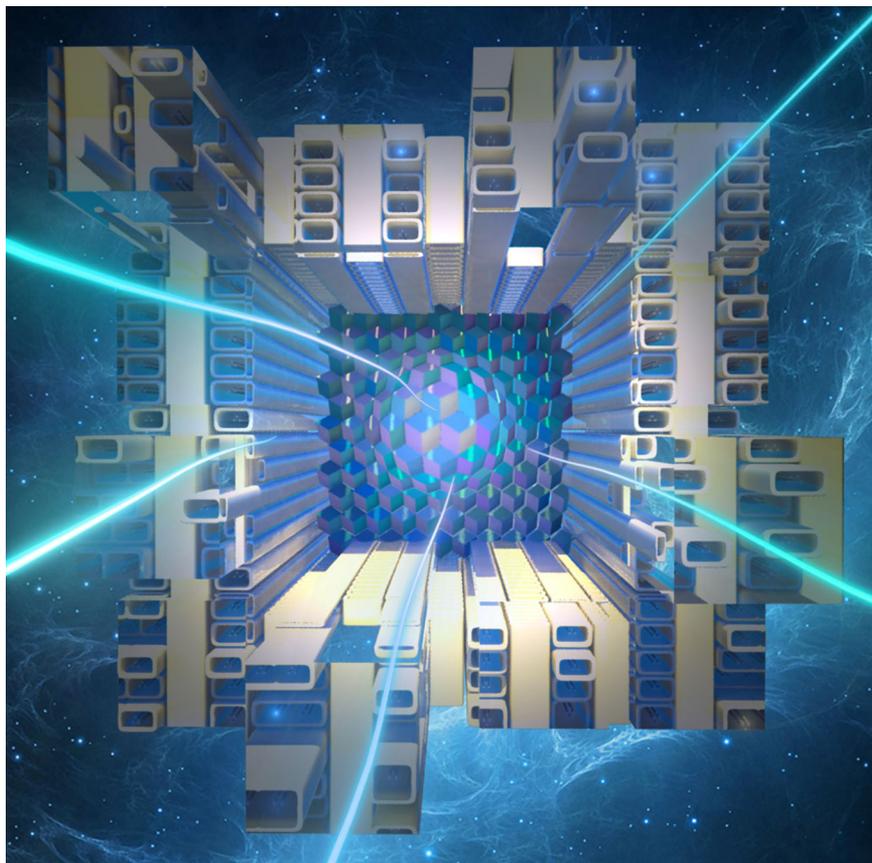
NOvA is a large above-ground neutrino detector made mostly out of plastic PVC pipes filled with mineral oil, which is the material with which the neutrinos interact. Neutrinos are constantly being fired into the NOvA detector, and on the rare occasion that a neutrino interacts with the mineral oil, the collision releases protons, neutrons, and other types of particles. As these outgoing particles travel through the oil, they leave energy in the form of a very tiny bit of light. Photosensitive optical fibers that are installed inside the PVC pipes detect the tiny amounts of light, marking the locations of the particles' paths as they travel through the oil. Because the precision of the location of each particle path is limited by the size of the PVC pipes, the path can only be pinpointed to that extent within the full grid of pipes.

(art)ⁿ depicts this through both projection mapping and a PHSCologram work, using the grid-like design to transcend the data into a Victor Vasarely inspired artwork. Vasarely's work tends to use repeating shapes and different colors, and was an obvious fit for an artful analogy.

Victor Vasarely was a Hungarian-French artist widely considered the "grandfather of Op-Art art." With training as a graphic designer, Vasarely believed the correct use of color geometric shapes could lead to enhanced ways of perceiving space, matter, and energy in art. This form of geometric abstraction became known as Op-Art.

(art)ⁿ uses Vasarely's Op-Art geometric abstraction to artistically demonstrate both the inner workings and produced data of the NOvA detector. The geometric layout of the PVC piping inside the NOvA detector can create geometric data graphs with color indicating places of neutrino collision. (art)ⁿ expands on this and elevates it to Vasarely's colorful and energized Op-Art level.

This piece embodies a collision release of protons, neutrons and other particles through Vasarely's signature Op-Art lens.



Neutrinos and NOvA: A Vasarely Variation, 2016

Ellen Sandor and (art)[©]: Diana Torres and Chris Kemp

Jennifer Raaf, Sam Zeller, Thomas Junk and Fermi National Accelerator Laboratory

Special Thanks to Janine Fron

Digital PHSCologram, Duratrans, Kodolith, and Plexiglas

30 x 30 inches

Bubble Chamber Beginnings: Revisiting the Vintage

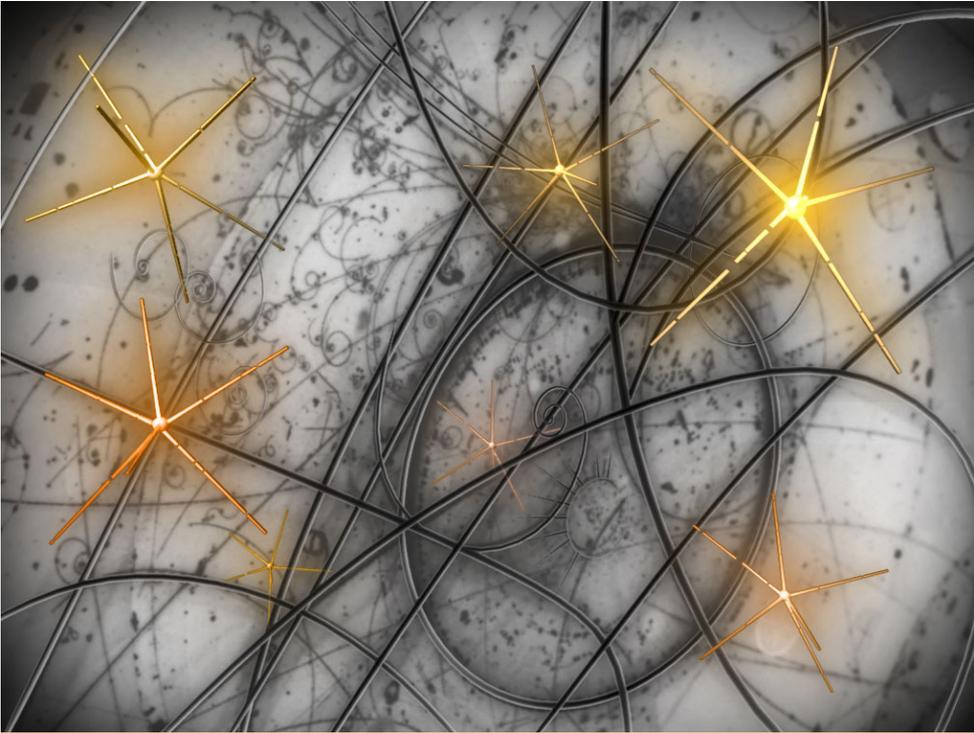
The bubble chamber PHSCologram sculpture was created as a reference to neutrino detectors of the past. A bubble chamber is filled with super-heated liquid, and charged particles traveling through the liquid leave trails of microscopic bubbles. The bubbles are expanded by changing the pressure of the chamber until they are large enough to be photographed.

Neutrinos cannot be seen directly; only the “aftermath” of their occasional collisions can be seen, and the neutrino type and energy must be inferred from the types and energies of the other particles that are created in the collision. The bubble trails of these other particles are photographed by cameras mounted at various locations on the chamber walls, and the trails curve in the images because of the magnetic field inside the chamber. The radius of curvature is proportional to the mass of the particle and its velocity.



Bubble Chamber Beginnings: Revisiting the Vintage, Panel 1, 2016

Data from these chambers is vintage, and scientists have far better ways of detecting neutrino interactions these days. However, the bubble chamber subject matter was chosen by (art)ⁿ because the data images produced from these detectors are truly beautiful artworks that still resonate.



Bubble Chamber Beginnings: Revisiting the Vintage, Panel 2, 2016

Ellen Sandor and (art)ⁿ: Diana Torres, Chris Kemp

Jennifer Raaf, Sam Zeller, Thomas Junk and Fermi National Accelerator Laboratory

Special Thanks to Janine Fron

Digital PHSCologram, Duratrans, Kodolith, and Plexiglas

30 x 40 inches

Visualizing the Invisible

Man Ray once said, “Some of the most complete and satisfying works of art have been produced when their authors had no idea of creating a work of art, but were concerned with the expression of an idea.” For Marcel Duchamp, “Artmaking is making the invisible, visible.”

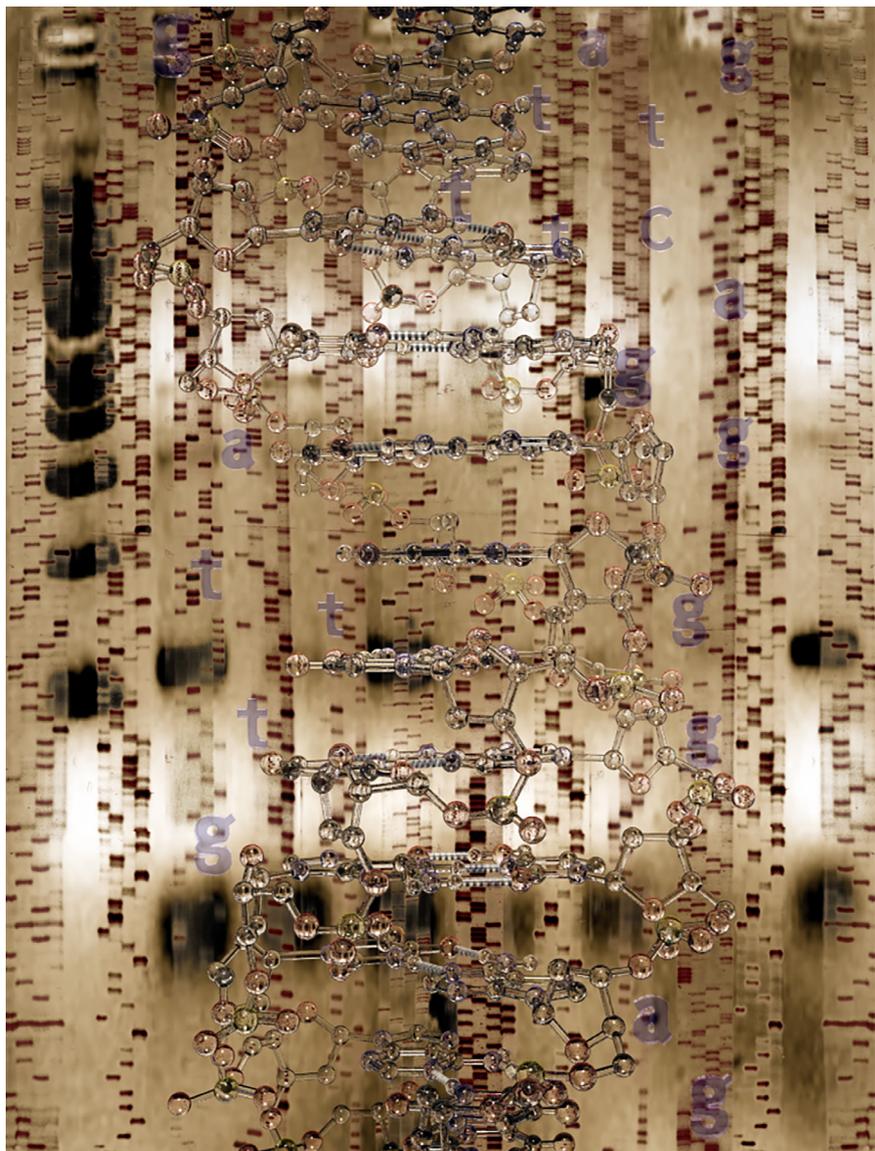
In 2003, Sandor and (art)ⁿ collaborated with scientists and physicians from the UCLA School of Medicine resulting in a reconstructed virtual portrait of real patient data from a PET scan that uniquely resembled one of Man Ray’s portrait photographs of Francis Picabia posing as Auguste Rodin’s *Monument to Balzac* sculpture. From what at first observation was considered scientific data transcended into a work of art that speaks to an encapsulated moment where photography and sculpture fused into new media.

In *Cryptobiology: Reconstructing Identity*, the glass DNA double helix in the foreground depicts type B DNA. This particular section was taken from the human DNA sequence coding for a protein called lysozyme. This enzyme breaks open the cell walls of some types of bacteria, and is part of our defense against infections. It was the first enzyme whose 3D structure was determined by X-ray crystallography. The sepia toned images in the background and the vertical strips staggered through the image are actual images of DNA fingerprints.

In *PET Study II: May Ray/Picabia Imitating Balzac*, a virtual sculpture of the male torso is maligned with lung cancer at the left apex, highlighted in a yellowish hue. Working from a series of processed Positron Emission Tomography (PET) images, inspired by Man Ray’s portrait of Francis Picabia, this piece shows a revolutionary way of looking at the human form in the original photograph from 1923, Man Ray captured the Dadaist artist, Francis Picabia in a rare moment, imitating Rodin’s 1898 *Monument to Balzac*, the famous French novelist.

PET Study II: May Ray/Picabia Imitating Balzac, 2003
Ellen Sandor and (art)ⁿ: Keith Miller, Janine Fron and Jack Ludden
Jim Strommer, Digital Media Group, Department of Molecular and
Medical Pharmacology, UCLA School of Medicine
Virtual Photograph/PHSCologram: Duratrans, Kodath, Plexiglas
40 x 30 inches





Cryptobiology: Reconstructing Identity, 2001

Kathleen Helm-Bychowski, Ph.D. Assistant Professor, Department of Chemistry, DePaul University

Ellen Sandor and (art)ⁿ: Keith Miller, Fernando Orellana and Janine Fron

Special thanks to Stephan Meyers

Virtual Photograph/PHSCologram: Duratrans, Kodalth, Plexiglas

40 x 30 inches

“The manner in which (art)ⁿ builds up the multiple layers of the sculpture echoes in reverse the way that scanning technologies deconstruct the body as a series of planes. For positron emission tomography, or PET scans, which allow scientists to explore disease at the molecular level in a living patient, a subject is injected with a tracer labeled with short-lived, radioactive pharmaceuticals. The isotope-tagged material moves through the body, giving off particles called positrons during radioactive decay.

When they collide with electrons, they produce photons. The photons give off signals that are picked up by the PET scanner, which is a ring of electronic detectors that surrounds the body. The resulting signals are fed into a computer, which reconstructs them as a picture sequence of planes cut through the body.

But by using the Picabia portrait, (art)ⁿ also pointedly includes a third concept about the layering and reproduction of the human form. In the photograph, the bare-chested artist is said to be imitating the virile posture of Auguste Rodin’s sculpture, *Monument to Balzac* (1898), a massive portrait of the famed French novelist. The portrait photographer Nadar wrote in a memoir that Balzac was afraid to have his picture taken because he believed that “all physical bodies are made up entirely of layers of ghostlike images, an infinite number of leaflike skins laid on top of the other.” Balzac also thought that man was incapable of “creating something from nothing [and] . . . concluded that every time someone had his photograph taken, one of the spectral layers was removed from the body and transferred to the photograph.” What one was giving up was “the very essence of life.”

Although Balzac misperceived the way a photographic image is made, his fear can be seen as a prescient vision of scientific capabilities. Millions of ghostlike layered images have been taken in the name of science. They reside in laboratories and doctor’s offices around the globe. Although they have been made for the purpose of preserving, rather than giving up the “essence of life,” it is humbling to know how closely we can inspect life’s origins and inner workings.”

Carol Squires, Curator
excerpt from *The Art of Science* (2004)
International Center of Photography

Virtual Architecture

A significant portion of (art)ⁿ's portfolio has explored architectural themes. Why Architecture? Since humankind started making images, artists have sought to use art to create virtual worlds that would bring their thoughts, beliefs, and emotions to life in the minds of others. This quest has demanded environments that are three dimensional and immersive. For millennia, architecture and theater filled this need. In particular, architecture offered the most immersive solution: an individual could navigate through its spaces, absorbing their religious, political, and/or aesthetic content.

Sandor and (art)ⁿ also explored key architectural works of Frank Gehry, Mies van der Rohe and Frank Lloyd Wright, deconstructed to reveal the sculptural aspects of their assemblage, made of titanium, glass and brick materials. Gehry's Pritzker Pavilion in Millennium Park, van der Rohe's Farnsworth House and Wright's Robie House are all considered pioneering works of architecture Chicago is renowned for.



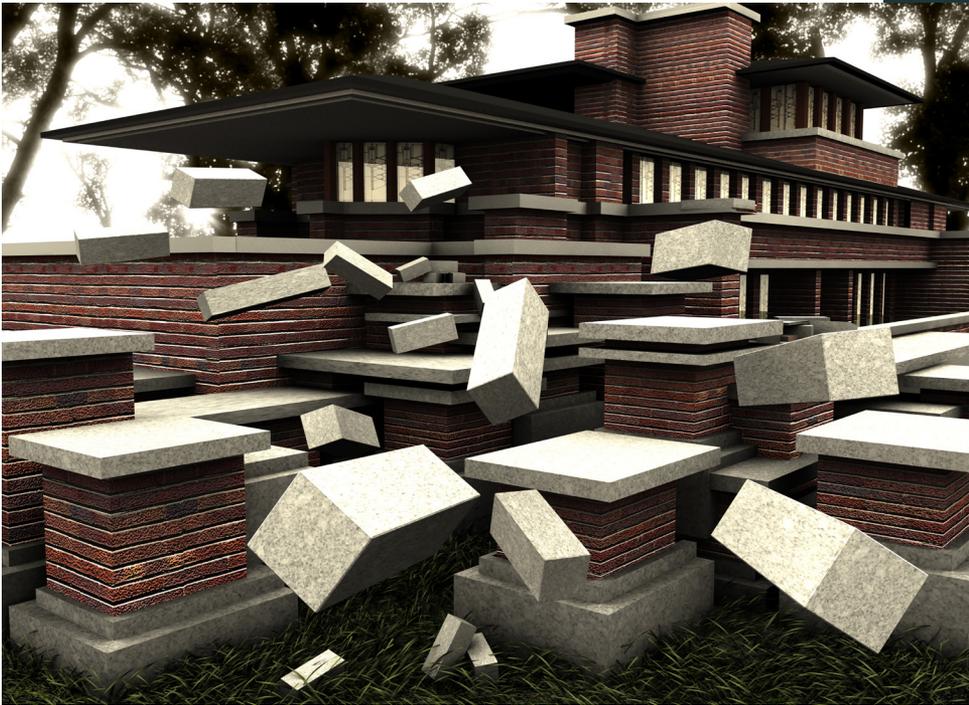
Mies-en-scène: The Farnsworth House, 2009

Ellen Sandor and (art)ⁿ: Chris Kemp, Chris Day, and Ben Carney
Digital PHSCologram, Duratrans, Kodolith, and Plexiglas
24 x 40 inches

Mies-en-scène: The Farnsworth House, This PHSCologram demonstrates Mies's evolution from the constructivist geometry of the Barcelona Pavilion to the minimalist, open and transparent space that became part of his signature style.

"The mother art is architecture. Without an architecture of our own we have no soul of our own civilization." - Frank Lloyd Wright

Reconstructing the Wright Space, it recalls the recent exterior restoration of Frank Lloyd Wright's Robie House. The repeated porch parapets and projecting limestone slabs evoke the crowned urban space that has been the environment of the house from its inception in 1909.



Reconstructing the Wright Space, 2009

Ellen Sandor and (art)^o: Chris Kemp, Chris Day, Ben Carney and Miguel Delgado
Digital PHSCologram, Duratrans, Kodolith, and Plexiglas
30 x 40 inches

Bringing this mini survey of the progression of architectural style into the 21st century, we view *Pritzker Deconstructed (Gehry Chicago)*, based on the Pritzker concert pavilion by Frank Gehry in Chicago's Millenium Park. Frank Gehry remarked that "architecture should speak of its time, place, but yearn for timelessness." The post-modern curved panels of the band shell facade fly out accentuating their organic fluidity, only realizable using modern computer technology - at the same time that they adorn the 2,500 year old architectural form of the amphitheater.



Pritzker Deconstructed (Gehry Chicago), 2008
Ellen Sandor and (art)ⁿ: Chris Kemp, Chris Day, Ben Carney and Miguel Delgado
Digital PHSCologram, Duratrans, Kodolith, and Plexiglas
30 x 40 inches

Townhouse Revisited

Created for “Townhouse,” an architectural competition sponsored by the Graham Foundation. *Townhouse Revisited* addresses issues of the body, public space, and touch in the architecture of virtual reality. The work was created in response to such questions as if hard matter and gravity offer no impediment in virtual reality, what then will meeting, working and playing in spaces look like there?



Townhouse Revisited, 1999

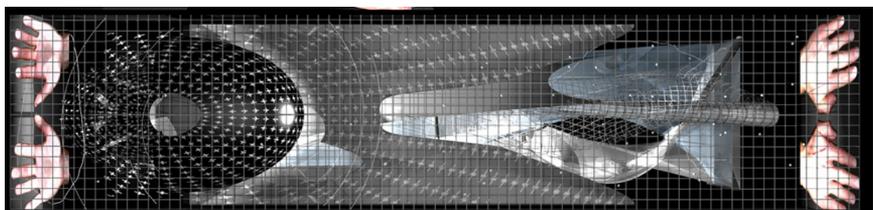
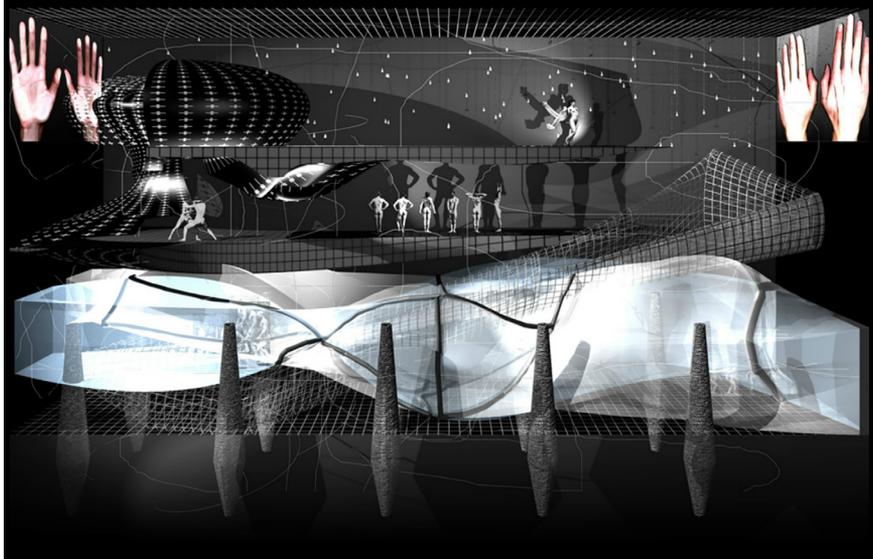
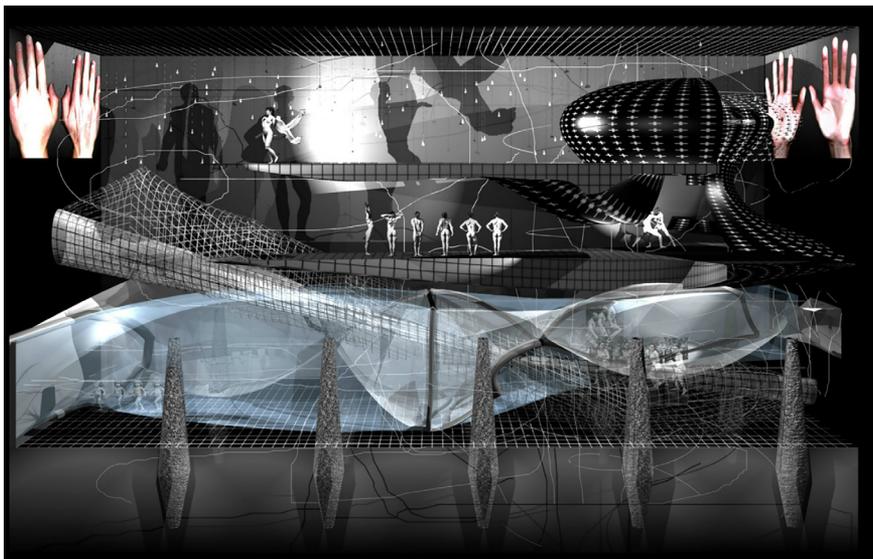
Thomas J. McLeisch

Ellen Sandor and (art)^o: Fernando Orellana, Nichole Maury, Todd Margolis, and Janine Fron

PHSCologram Sculpture, Duratrans, Kodolith, and Plexiglas

Digital Photograph by James Prinz Photography

40 x 10 x 65 inches



“Since the dawn of civilization, we humans have endeavored to give substance to the imagined worlds of our ideas – often using those constructs as sanctuaries from conflict. We have used literature, theater, art, and architecture to achieve this goal. Historically, architecture has offered the most immersive venue for the struggle to bring “virtual worlds” to life by reason of its three-dimensionality (and its ability to bring peace by providing physical shelter). Through the lens of modern and contemporary architecture, this exhibition explores the blurry space between reality and virtual reality (VR) and how works of art can emerge from that arena.

In 1983 and inspired by Man Ray’s passion for experimentation, Ellen Sandor founded (art)ⁿ, an artists’ collaborative group. They produced virtual three-dimensional images called PHSColograms that could be seen with only the naked eye and could visualize the invisible – thus making them precursors to 21st century computer-based VR. Since its inception, (art)ⁿ has been a medium for visual artists to expand their vision into the world of 3D. Under Sandor’s direction, (art)ⁿ has also helped scientists visualize mathematical formulas, complex molecules, viruses, turbulence patterns and other phenomena and turned these images into works of art.”

Michel Ségard, Editor, *New Art Examiner*
(excerpt from *Deconstruction in the Virtual World: Building Peace by Piece*, 2015)

Virtual Portraits

Virtual portraits produced in collaboration with Ed Paschke, Karl Wirsum and Gero Gries appear to be whimsical at first glance, but take on another form of deconstructed realities. Paschke's *Self-Portrait* and Gero Gries's *Sally C* are examples of early virtual portraits, sculpted from scanned imagery of real subjects, while Wirsum's characters are entirely imagined, computer generated characters. The selected virtual portraits recall a Duchampian view of the world that invites the viewer to be more present, in which our world would otherwise become dystopian without our conscious awareness.

Sally C, 2004

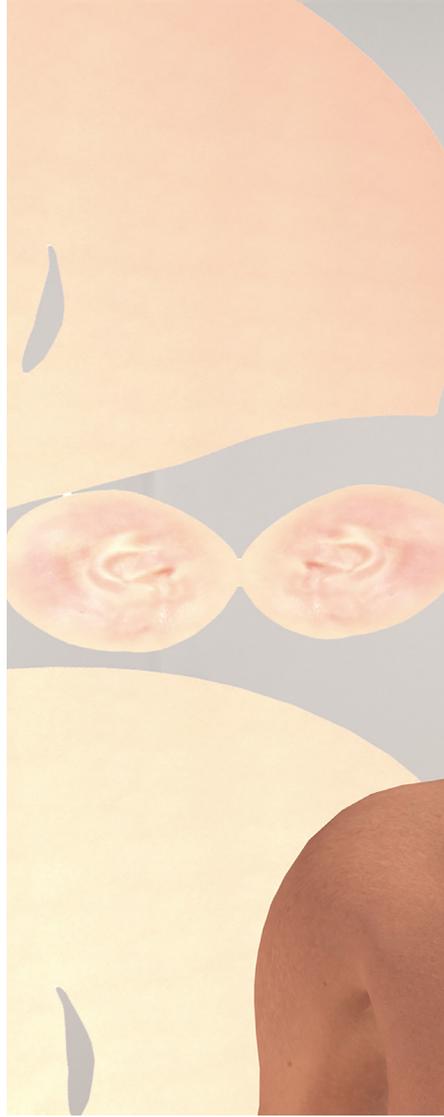
Gero Gries

Ellen Sandor and (art)!: Keith Miller and Janine Fron

Virtual Photograph/PHSCologram: Duratrans,

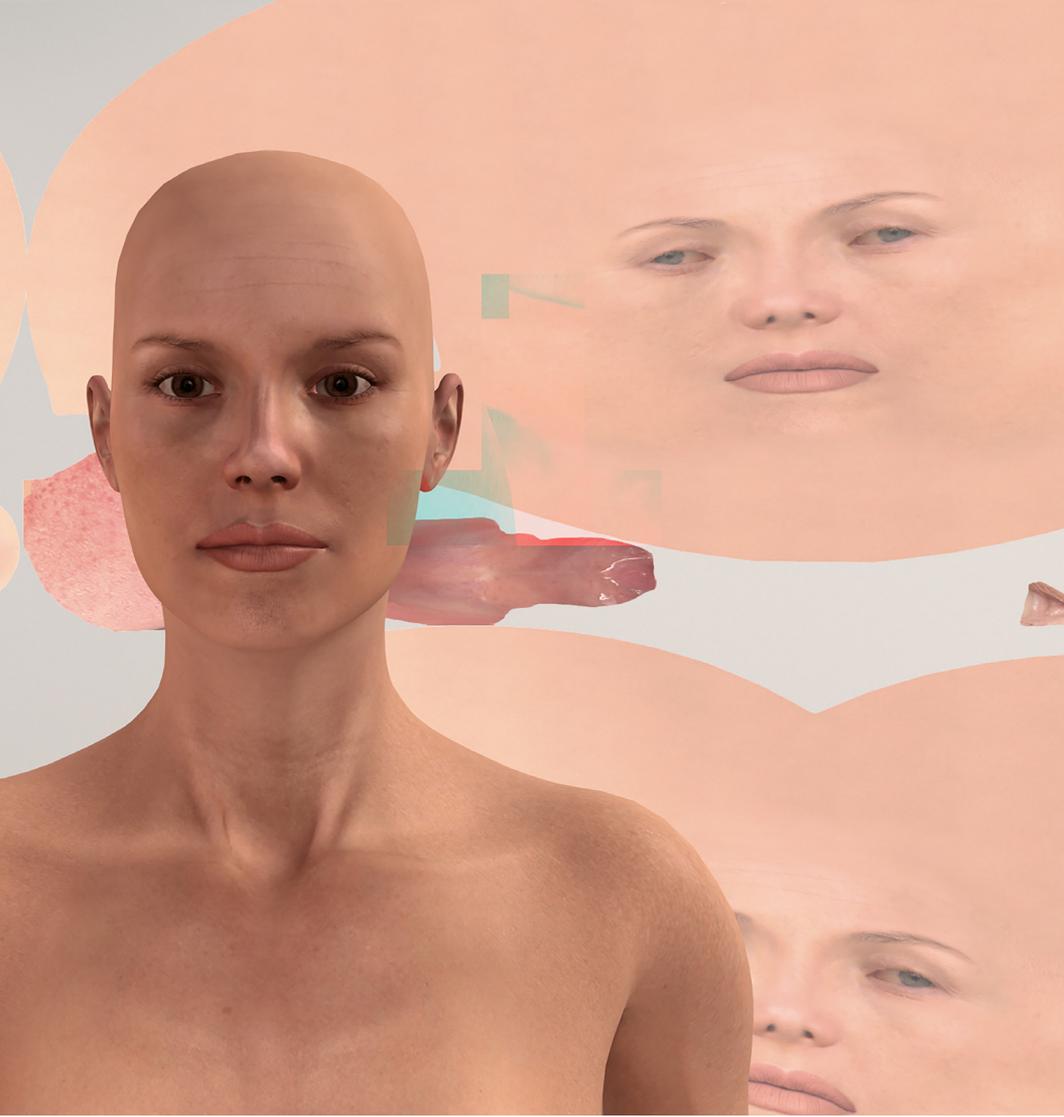
Kodalith, Plexiglas

30 x 40 inches



Sally C, "Perfection is an important and obvious characteristic of the pictures of Gero Gries. Usin the computer, this can be achieved. Basically a painterly procedure, there is no photograph involved. Each detail down to pixel is elaborated. The exhibited artworks are part of a new cycle of pictures, where spaces, with minimal inventory, the figure is placed in a reduced room. Eerie, familiar, artificial beauty!

The exhibited lightbox feel closer to a movie, in the manner which they deal with light and movement, than a photograph does. Even so, they

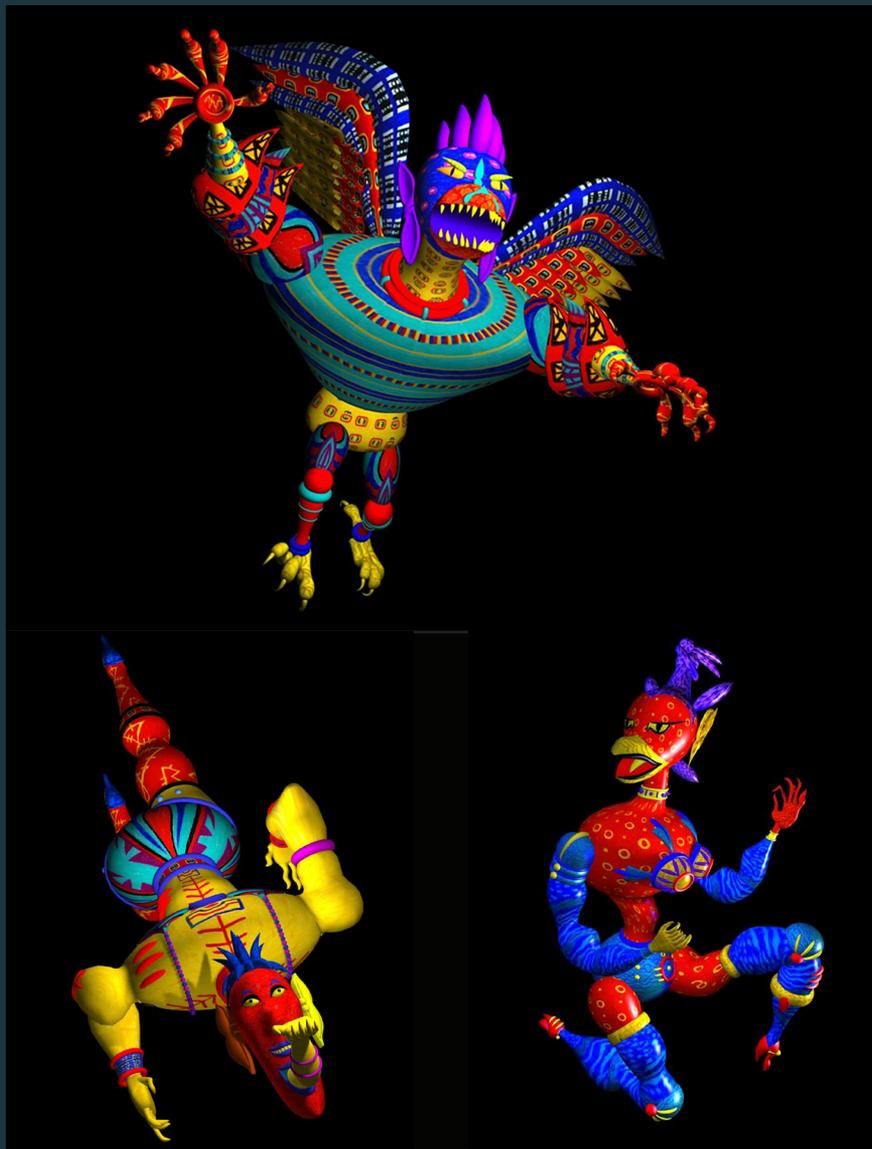


were created with high technology, and the final object, the technique moves into background. The backlit picture attracts us and allows us to get into this fascination again on an unknown level.”

–Wolf Lieser, Digital Art Museum [DAM]

“My objects develop out of accuracy and carelessness. Some appear in my thoughts, like a bubble, which drifts to the surface. Most of these pictures in my head are perfect, the difficulty is to make them a reality.”

–Gero Gries, 1999



Bird Man, Mouth Girl, Bird Lady, Details from Egg Drop, 2002

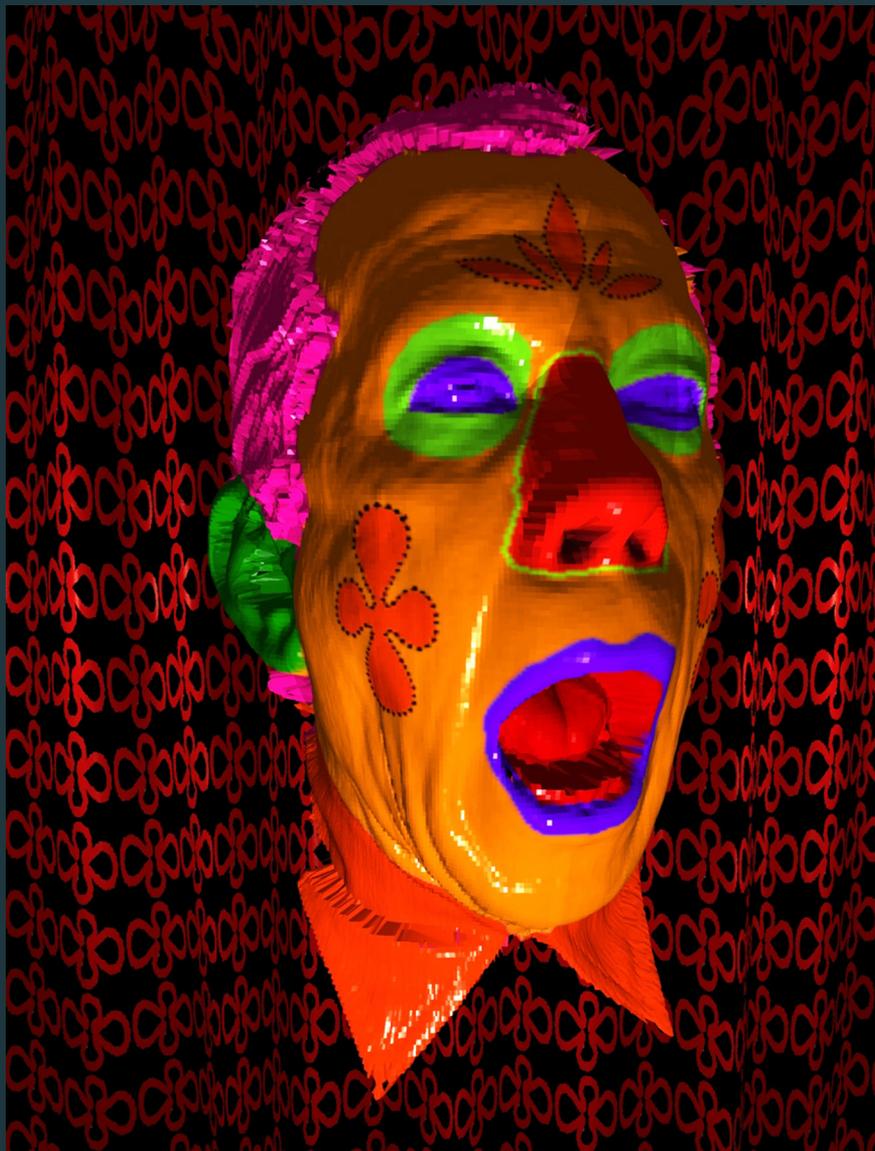
Karl Wirsum

Ellen Sandor and (art)^{ns}: Pete Latrofa, and Keith Miller

Virtual Photographs/PHSColograms: Duratrans, Kodalth,

Plexiglas

14 x 11 inches



Self-Portrait, 2000

Ed Paschke

Ellen Sandor and (art)^{ns}: Fernando Orellana, Todd Margolis, Nichole Maury, Sabrina Raaf and Janine Fron

Special thanks to Paul Neumann, BVIS, University of Illinois at Chicago

Virtual Photograph/PHSCologram: Duratrans, Kodalath, Plexiglas

24 x 20 inches

Ellen Sandor

Founding Artist and Director, (art)ⁿ

Ellen Sandor is a new media artist and Founder/Director of the collaborative artists' group, (art)ⁿ. In 1975, she received an MFA in Sculpture from the School of the Art Institute of Chicago. Her time at SAIC led her to be inspired by photography, sculpture, and video, and intrigued by the spiritual nature of Outsider Art. In the early 1980s, Sandor had the vision to integrate these elements with other art forms, including computer graphics that resulted in a new medium she called PHSColograms, which are 3D barrier-screen computer-generated photographs and sculptures.

Because PHSColograms are a collaborative endeavor, Sandor has been fortunate to work with like-minded artists, scientists, technologists, and thinkers. These collaborators hail from distinguished institutions and universities including: The Scripps Research Institute, NASA Ames, Langley and Lewis Research Centers, JPL, and the University of Illinois. Some acclaimed artists Ellen and (art)ⁿ have worked with include: Ed Paschke, Karl Wirsum, Christopher Landreth, Martyl and Claudia Hart. All these collaborators have shared her enthusiasm for utilizing technology to push conceptual and technical boundaries within the arts.



The works of (art)ⁿ are in the permanent collection of the Art Institute of Chicago, Santa Barbara Museum of Art, International Center of Photography, University of Oklahoma, Smithsonian Institution, Victoria & Albert Museum, and others. Commissions include City of Chicago Public Art Program, State of Illinois Art-in-Architecture Program, and SmithBucklin Corporation. Sandor co-authored U.S. and international patents awarded to her for the PHSCologram process.

She also co-authored papers that have been published in Computers & Graphics, IEEE, and SPIE. She is an eDream Affiliate and Visiting Scholar of Culture & Society, National Center for Supercomputing Applications, University of Illinois, Urbana-Champaign; Affiliate Graduate Faculty, University of Arkansas at Little Rock; Secretary, Board of Eyebeam; and Advisory Board Chair, Gene Siskel Film Center, School of the Art Institute of Chicago.

She serves on the Board of Governors, School of the Art Institute of Chicago and is a Life Trustee of the Art Institute of Chicago. In 2012, she received the Thomas R. Leavens Award for Distinguished Service to the Arts through Lawyers for the Creative Arts, and in 2013, received the Gene Siskel Film Center Outstanding Leadership Award. Sandor is also co-founder of the Richard and Ellen Sandor Family Collection, and in 2014, was awarded an Honorary Doctorate of Fine Arts from the School of the Art Institute of Chicago. She was awarded Fermilab's Artist in Residence for 2016. In 2017, she was honored by the *Bulletin of the Atomic Scientists* for her longstanding commitment to integrating art and science. She is co-editor and contributor of *New Media Futures: The Rise of Women in the Digital Arts* (2018) published by the University of Illinois Press.

(art)ⁿ Collaborators

Diana Torres started working with (art)ⁿ as a 3D artist in 2011; she currently is the studio director of the collective. Torres is an interdisciplinary artist from Colombia whose work includes animations, illustrations, paintings, drawings, and sound. She has exhibited and screened her work in Europe, Australia, USA, and South America. A graduate of Interlochen Arts Academy in visual arts and classical piano, Diana received an MFA from the School of the Art Institute of Chicago in 2012.

Azadeh Gholizadeh started working with (art)ⁿ as a 3D artist in 2017. Born in Tehran, Azadeh received her MA in architecture from Iran University of Science and Technology (IUST) in 2009, and her MFA from the School of the Art Institute of Chicago in 2012. She has participated in group shows at Hyde Park Art Center, Heaven Gallery and Goldfinch's Flat File among others. In her current practice she explores tensions and challenges of diaspora as a way to reach towards places and identities that can't be articulated by words. Gholizadeh was a resident at the BOLT Residency and ACRE.

(art)ⁿ Virtual Reality

(art)ⁿ's virtual environments are created with Autodesk Maya[®]: a three-dimensional computer graphics software that has been used by the collaborative for 20 years. It is a powerful engine where complex modeling and rendering tools help create creative three-dimensional images and animations. The development of the virtual environments and programming are created with Unity 5: a development platform primarily known for creating games. This software provides a rich ecosystem that allows the artist to



weave together nearly every form of digital asset-images, three-dimensional models, audio, and more – with a powerful object-oriented scripting language allowing for boundless creativity. The virtual worlds created with these two engines allow players to interact with and navigate them by using the Oculus Rift. These immersive simulations of three-dimensional environments are controlled by the movement of the body.

(art)ⁿ PHSColograms

PHSCologram (pronounced skol-o-gram) is a new media acronym for photography, holography, sculpture and computer graphics. A number of rendered views of a virtual scene are digitally interleaved, in which the first line of every image is combined with the corresponding first line, and so forth until a recombined single image is made. This blurring of images into a single piece is attached to a line screen—a black piece of film with corresponding clear lines that is affixed to a piece of plexiglas, and allows a viewer to interpret the digital photograph as a three-dimensional sculptural object when backlit. The PHSCologram process is patented and was licensed by Picker International and 3M.

Commissioned projects include works in Smithsonian Institution, Museum of Contemporary Art Chicago, Santa Barbara Museum of Art, Museum of Jewish Heritage, International Center for Photography, City of Chicago Department of Cultural Affairs Public Art Program and State of Illinois Art-in-Architecture Program. Museum collections include Art Institute of Chicago; Roger Brown Study Collection, School of the Art Institute of Chicago; Fred Jones Jr. Museum of Art, University of Oklahoma; Brauer Museum of Art, Valparaiso University; Chazen Museum of Art, University of Wisconsin-Madison; Union League Club of Chicago; Museum of World Culture; Buckminster Fuller Institute; National Academy of Sciences; and Musée Carnavalet Paris.

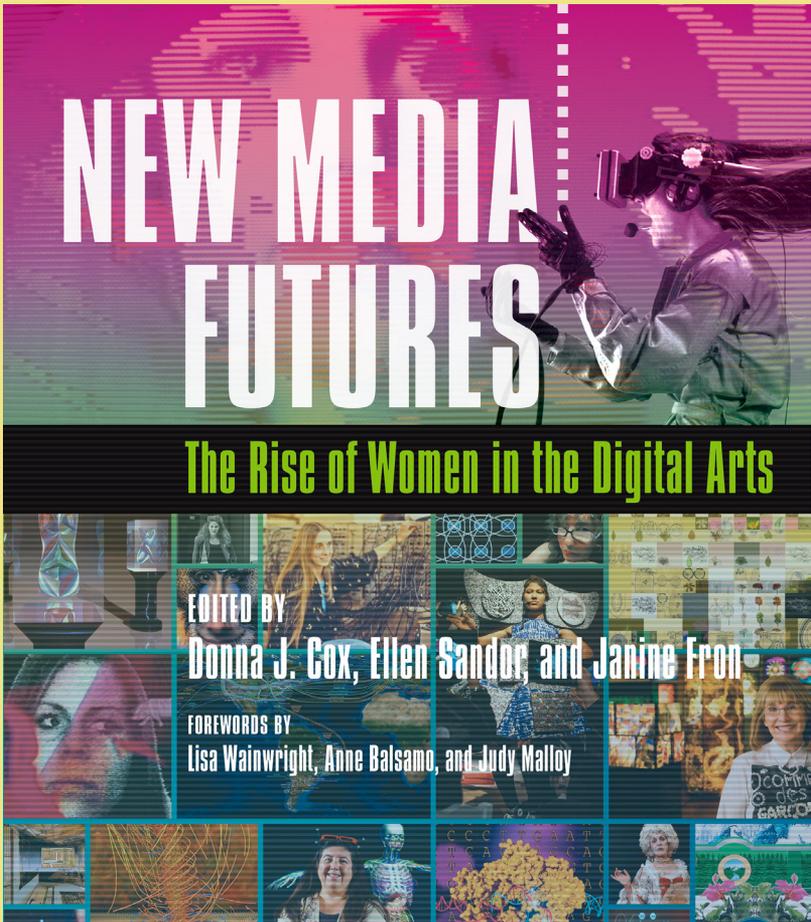


New Media Futures: The Rise of Women in the Digital Arts

Edited by Donna J. Cox, Ellen Sandor, and Janine Fron
University of Illinois Press

“This is a fascinating and important book. It will appeal to scientists, technologists, artists and the general public. It tells wonderfully exciting stories of creative, risktaking women (and men) that will inspire present and future generations. These stories demonstrate that the creative spark that drives scientists and artists knows no disciplinary boundaries. And it is simply a delightful read.”

—Walter E. Massey, Chancellor, School of the Art Institute of Chicago



“A very necessary book that all daughters should read.”

—Shannon Jackson, Associate Vice Chancellor for the Arts and Design,
University of California, Berkeley

“*New Media Futures: The Rise of Women in the Digital Arts* is poised to become a valuable study tool for those interested in the intersection between art, women artists, and technology.”

—Hyperallergic

Blazing artistic trails through the digital age; Trailblazing women working in digital arts media and education established the Midwest as an international center for the artistic and digital revolution in the 1980s and beyond. Foundational events at the University of Illinois and the School of the Art Institute of Chicago created an authentic, community-driven atmosphere of creative expression, innovation, and interdisciplinary collaboration that crossed gender lines and introduced artistically-informed approaches to advanced research.

Interweaving historical research with interviews and full-color illustrations, *New Media Futures* captures the spirit and contributions of twenty-two women working within emergent media as diverse as digital games, virtual reality, medicine, supercomputing visualization, and browser-based art. The editors and contributors give voice as creators integral to the development of these new media and place their works at the forefront of social change and artistic inquiry. What emerges is the dramatic story of how these midwestern explorations in the digital arts produced a web of fascinating relationships. These fruitful collaborations helped usher in the digital age that propelled social media.

Contributors: Carolina Cruz-Neira, Collen Bushell, Nan Goggin, Mary Rasmussen, Dana Plepys, Maxine Brown, Martyl Langsdorf, Joan Truckenbrod, Barbara Sykes, Abina Manning, Annette Barbier, Margaret Dolinsky, Tiffany Holmes, Claudia Hart, Brenda Laurel, Copper Giloth, Jane Veeder, Sally Rosenthal, Lucy Petrovic, Donna J. Cox, Ellen Sandor, and Janine Fron.

Selected Exhibitions

Chicago New Media 1973-1992, Gallery 400, University of Illinois at Chicago, November 1-December 13, 2018

It is Two Minutes to Midnight, Weinberg/Newton Gallery, Chicago, IL, May 11 - May 19, 2018

Neutrinos in a New Light: Selected Works of Art & Science, Fermilab Art Gallery, Batavia, IL, December 2, 2016-March 17, 2017

Deconstruction in the Virtual World: Building Peace by Piece, National Arts Club, Gramercy Park, NY, November 2-14, 2015

Without You I'm Nothing: Art and Its Audience, Museum of Contemporary Art Chicago, November 20, 2010 - May 1, 2011

(art)ⁿ: Virtually Visionary - Exploring 2D Forms in 3D Space, Galeria Arteconsult, Panama, September 15-October 9, 2010

Concepts of Construction: (art)ⁿ new work and retrospective, Zhou B Art Center, Chicago, October 24-December 12, 2009

A Mind at Play, The Art Institute of Chicago, June 14-September 7, 2008

Identities, Santa Barbara Museum of Art, November 27, 2007-August 31, 2008

Intelligent Design, The Museum of New Art, Detroit, MI, September 15-October 13, 2007

Ellen Sandor (art)ⁿ: 3D pixels realized 1982-2006, art@IIT, Kemper Room Art Gallery, Paul V. Galvin Library, Illinois Institute of Technology, Chicago, IL, November 16, 2006-January 20, 2007

AIDS in the Age of Globalization, Museum of World Culture, Gothenberg, Sweden, December 2004-July 2006

portrait, Stiftung Starke Gallery, Berlin, Germany, September 23-October 23, 2005

(art)ⁿ: virtual illusion 1994-2004/pixels in perspective, [DAM], Berlin, Germany, September 21-November 5, 2004

Visionary Anatomies, Keck Center Gallery, National Academies, Washington D.C. September 15-December 31, 2004

The Art of Science Imaging the Future: The Intersection of Science, Technology and Photography, International Center of Photography, New York, NY, March 12–May 30, 2004

Art of the Americas, Santa Barbara Museum of Art, Santa Barbara, CA, March 13–November 21, 2004

Gene(sis): Contemporary Art Explores Human Genomics, Frederick R. Weisman Art Museum, University of Minnesota, Minneapolis, MN, January 31–May 2, 2004

A Decade of Collecting, The Santa Barbara Museum of Art, Santa Barbara, CA, March 8–June 15, 2003

Genomic Issue(s): Art and Science, The Graduate Center Art Gallery, City University of New York, New York, NY, February 25–April 5, 2003

How Human: Life in the Post-Genome Era, International Center of Photography, New York, February 28–May 25, 2003

PhotoGENEsis: Opus 2: Artists' Response to the Genetic Information Age, Santa Barbara Museum of Art, November 9, 2002–February 9, 2003

(art)ⁿ Virtual Visions: Three Decades of Collaboration, Brunner Art Museum, Iowa State University, October 29, 2002–January 5, 2003

Digital: Revolutions in Print Making, Brooklyn Museum of Art, June 22–September 2, 2001

Genomic Art: Portrait of the 21st Century, University of California Santa Cruz, Santa Cruz, CA, June 18–August 27, 2001

Chorus of Light: Photographs from the Sir Elton John Collection, High Museum of Art, Atlanta, GA, November 4, 2000–January 8, 2001

Paris in 3D: From Stereoscopy to Virtual Reality 1850–2000, Musée Carnavalet, Paris, France, October 4–December 31, 2000

Galerie Darthea Speyer, Paris, February 2000

U.S. Department of State Art in Embassies Program, for exhibition in American Embassy: Ambassador McDonald, Harare, Zimbabwe 1998–2000

Galerie Darthea Speyer Paris, September 24–November 14, 1998

U.S. Department of State Art in Embassies Program, for exhibition in American Embassy: Ambassador Kornblum, Bonn, Germany, 1997–1998

DIVIDED WE SPEAK, Museum of Contemporary Art, Chicago, IL, September–November, 1997

Art in Chicago 1945–1995, Museum of Contemporary Art, Chicago, IL, September 18, 1996–March 23, 1997

From Holography to Virtual Photograph, Technorama, Winterthur, Switzerland, August 16, 1996–April 13, 1997

Beyond the Global Village, Triennale di Milano, Milano, Italy, May 22–July 9, 1995

Virtual Vertigo, Realidad Virtual S.L., Madrid, Spain, February 18, 1994–March 10, 1994

Photography after Photography—Memory and Representation in the Digital Age

A Project of Siemens Kulturprogramm, December 1994–January 1997

Curatorial team: Hubertus v. Amelunxen, Stefan Iglhaut and Florian Rötzer in collaboration with:

Cornelia Faist, Aktionsforum, München (Germany)

Carl Aigner, Kunsthall Krems (Austria)

Karl Manfred Fischer, Städtische Galerie Erlangen (Germany)

Perdita v. Kraft, Brandenburgische Kunstsammlungen Cottbus (Germany)

Finn Thrane, Museet for Fotokunst, Odense (Denmark)

Urs Stahel, Fotomuseum Winterthur (Switzerland)

Asko Mäkelä, Finnish Museum of Photography, Helsinki (Finland)

Patrick T. Murphy, Institute of Contemporary Art, Philadelphia (USA)

Robyn Archer, Adelaide Festival (Australia)

The New Images, George Eastman International House of Photography, Rochester, NY, July 11–August 7, 1993

Computer and Art, idmi-Istituto Dalle Molle di Metodologie Interdisciplinari, Lugano, Switzerland, September 18–October 6, 1991

El Art, Retretti Art Centre, Punkaharju, Finland, May–November 1991

The Third Emerging Expression Biennial: The Third Dimension and Beyond, Bronx Museum, Bronx, NY, February–June 1991

Strange Attractors: Signs of Chaos, The New Museum of Contemporary Art, New York, NY, September–November, 1989

Contributing Artists

1983 - 2019

Ben Carney
Michael Cone
Chris Day
Miguel Delgado
Janine Fron
Nick Gaul
Azadeh Gholizadeh
Randy Johnson
Gary Justis
Chris Kemp

Pete Latrofa
Jack Ludden
Todd Margolist
Nichole Maury
TJ McLeish
Thomas Meeker
Stephan Meyers
Keith Miller
Fernando Orellana
Sabrina Raaf

Mark Resch
William Robertson
Mike Siegel
Dan Sandin
Diana Torres
Dien Truong
Gina Uhlmann
Jim Zanzi

Major Collaborators

Stephanie Barish
Geoffrey Baum
BINO & COOL
Steve Boyer
Benjamin Chang
Donna Cox
Carolina Cruz-Neira
Charles Csuri
Tom DeFanti
Margaret Dolinsky
Michael Dunbar
Andre Ferella
Barry Flanary
George Francis

Phillipe Paul Froesch
Carla Gannis
David Goodsell
Gero Gries
Anton Hand
Claudia Hart
Mr. Imagination
Chris Landreth
Robert Lostutter
Gerhard Mantz
Feng Mengbo
Ron Nielsen
TJ O'Donnell
Arthur Olson

Ed Paschke
Bob Patterson
Dana Plepys
Maggie Rawlings
Miroslaw Rogala
Cynthia Beth
Rubin
Dan Sandin
Larry Smarr
Lisa Stone
Margaret Watson
Karl Wirsum
Zhou Brothers

Gallery Affiliations

Maya Polsky Gallery
Chicago, IL, 1997 - 2015

Oskar Friedl Gallery
Chicago, IL, 1995 - 2006

Galería Arteconsult
Panama City, Panama, 2010-12

Rhona Hoffman Gallery
Chicago, IL, 1993 - 1994

Kasia Kay Art Projects
Chicago, IL, 2007 - 2009

Feature Inc.
New York, NY, 1985 - 1993

Jean Albano Gallery
Chicago, IL, 2000 - 2006

Major Institutional and Corporate Collaborators

SmithBucklin Corporation
Murphy/Jahn Architects
Howard Ecker + Company
Cornell University
Genentech, Inc.
Iowa State University
Jet Propulsion Laboratory, California
Institute of Technology
Johnson & Johnson Pharmaceutical
Research & Development, L.L.C.
Lawrence Berkeley Lab
NASA Ames, Langley, and Lewis
Research Centers
San Diego Supercomputing Center

The Scripps Research Institute
UCLA School of Medicine
USAE Waterways Experiment Station
University of Illinois
Yale University
Fermi National Accelerator
Laboratory
The Doudna Lab, UC Berkeley
Innovative Genomics Institute, UC
Berkeley
Bulliten of the Atomic Scientists
Stevens Lab at Boston Children's
Hospital, Harvard Medical School

Collections

Art Institute of Chicago
Buckminster Fuller Institute
Fred Jones Jr. Museum of Art,
The University of Oklahoma
Smithsonian National Museum of
Natural History
Howard Ecker + Company
International Center of Photography
Musée Carnavalet, Paris
Museum of Contemporary Art,
Chicago
Murphy/Jahn, Inc. Architects
Museum of Jewish Heritage -
A Living Memorial to the Holocaust
Northwestern University

University of Chicago
Ed Paschke Art Center
Keck Center Gallery, National
Academies
LUMA- Loyola University Museum of
Art
Victoria and Albert Museum
Santa Barbara Museum of Art
Union League Club of Chicago
Chazen Museum of Art,
University of Wisconsin-Madison
Brauer Museum of Art, Valparaiso
University
Centre of Contemporary Art,
Warsaw
Roger Brown Study Collection,
School of the Art Institute of Chicago

Special Thanks to all of our collaborators . . .

(art)ⁿ

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