BELBRUNO'S UNIVERSE

Talia Page Editor

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1. INTRODUCTION

After a certain high level of technical skill is achieved, science and art tend to coalesce in esthetics, plasticity, and form. The greatest scientists are always artists as well.

-ALBERT EINSTEIN

When I first met Ed Belbruno, it was clear that he has a unique perspective; his vision of the Universe is unlike anyone else's. It is not every day that one encounters a talented artist who uses oils on canvas to mark out complex theories that are used to map routes from the Earth to the Moon and save spaceships.

The paintings in Belbruno's Universe encompass truths that are recognized without too much explanation, so I have organized a series of his works with only a brief exegesis to give the reader a bit of background. One does not need to be a celestial mathematician to contemplate the Universe or to feel emotion and depth in a painting.

There is richness in even the most barren of Belbruno's paintings He deliberately creates spaces that are left seemingly devoid of material or life, which paradoxally, fills the viewer with enigmatic wonder, and perhaps even enigmatic speculation of the nature of their own universe. Einstein once asserted that great scientists are always great artists. The opposite is not always true: great artists have not always been great scientists, and the Da Vinci's of the world are rare. It is a bold statement indeed to say that Ed Belbruno is among the modern-day Da Vinci's, but I am confident in its truth. It has been an honor to interview Ed Belbruno and share his Universe with the rest of the world.

Talia Page, Editor

2. NIGHT SCENES OF ANOTHER WORLD

This series was born out of Belbruno's sense of artistic urgency; it was created at a time when his days were overpoweringly dark. The irritating and relatively insignificant grind of academic life drove Belbruno back to the canvas after a period of ten barren years without picking up a brush. He had a successful career as a professor of celestial mechanics at Boston University and was up for a tenure position. However, he found it unsatisfying. Moreover, status and stability are rarely foundations that artists rely upon.

"It was a moment of unexplained spontaneity when I went out and bought a canvas for the first time after a decade. I painted *Mountainscape at Night* from the top down without a sketch or a plan. This is the piece that launched not only the rest of the series, but my career as an artist. These paintings poured forth with such unexplained force that my artistic expression could no longer be denied or ignored."

Six months later, Belbruno received an offer to work in the field of celestial mechanics at NASA's Jet Propulsion Laboratory in Pasadena amongst scenic mountains and stars that so closely resembled the paintings he made in Boston. Belbruno has the unique ability to look at the complexities of the Earth and stars and paint them in passionate simplicity. In his own words, he describes *Night Scenes of Another World*: "The concept behind my paintings during this era of my life represent a vast and pervading sense of universal simplicity."



Mountainscape at Night Oil on canvas, 30" x 40", February 1984



Mountains at Night Oil on canvas, 22" x 24", July 1984 Mountain Peaks Under the Stars, Oil on canvas, 30" x 40", August 1984





Spaceship Alkyd on canvas, 16" x 20", 1987



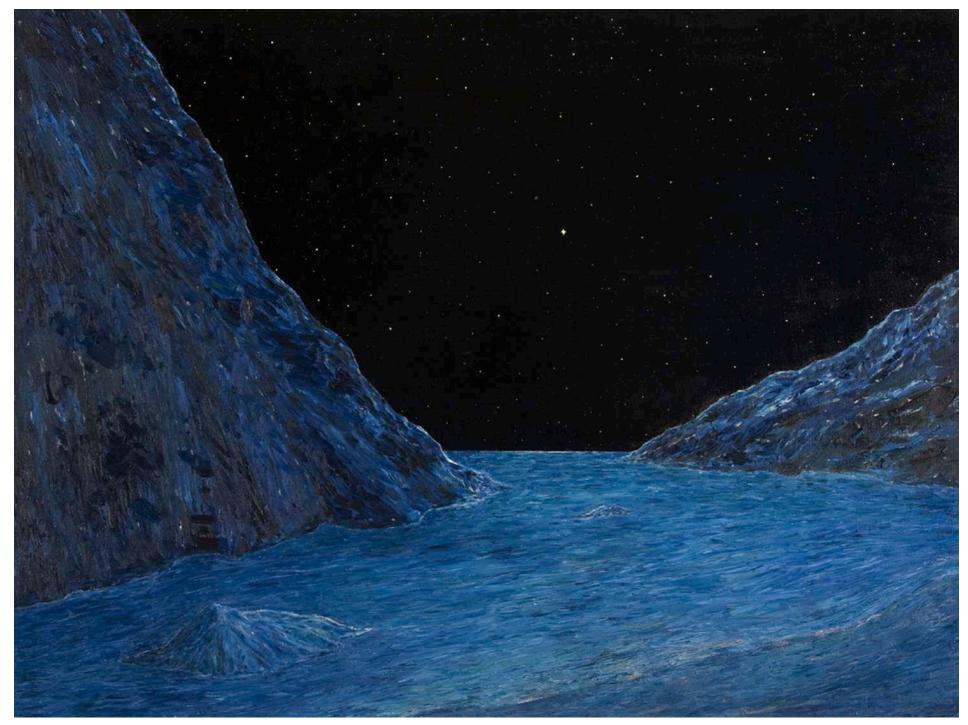


An Island Under the Stars Oil on canvas, 30" x 40", November 1999

Starscape Over Mountains on Another World Oil on canvas, 30" x 40", January 2000 NASA Executive Collection



Waterscape at Night Oil on canvas, 30" x 40", July 2000



3. THE PRIMITIVE HUT

This series was named by Apollo astronaut Edgar Mitchell, and is in keeping Belbruno's signature theme of universal simplicity. Belbruno's curriculum vitae reflects years of exploring intensely complex mathematical theories and multimillion dollar high tech space ships, yet his artwork is composed with the notion of beings as primitive. In a world saturated with self-generated complications amongst ourselves and our experiments with technology, Belbruno's perspective is a reminder that primitive elements cannot be engineered away. In these humbling works, grandeur exists only in the shadows; the starkness of humanity is once again subject to his barren landscape, devoid of distractions.

These pieces were painted while Belbruno was living in his art studio in St. Paul, Minnesota. He explains, "A frigid winter and a concrete floor assault the senses and forced me to contemplate the fundamentals upon which I base my existence. It was a cataclysmic time in my life, which, in hindsight, seems to have been necessary for reflection and discovery. These paintings were an important part of my experience in destroying illusions of grandeur to dig up something closer to reality—even if it is in another dimension."



Explosive Stars and a Hut Oil on canvas, 36" x 48", 1993



Shadow at the Door Oil on canvas, 36" x 48", December 1994 In Search of the Primitive Hut: Approaching Oil on canvas, 16" x 20", 1994

4. BARREN LANDSCAPES AND TREES

"Ed's my name and barren is my game," the artist chuckled when asked about this series, "Ironically, vast stretches of fallow land represents an abundance of freedom that enhances my creative spirit. We all project our ideas into empty spaces, and that is part of the beauty...Meaning metamorphosizes into some something unique with the passing of time, and it depends largely on the eyes of the beholder, of course."

Each painting in this series was created just before a significant move or career change. "My career designing trajectories to Jupiter sounds amazing, but this was dull and spiritless work. Empty, mindless engineering jobs are lonely. These pieces cheered me up at a time when I felt that my creativity was being buried," Belbruno mused. The Joshua Tree resembles a hand, reaching for help, though the pointed branches look dangerous. "In those days, it seemed like every cloud had a black lining. But there is something magical and wild in mystery and danger."



Desert at Joshua Tree Monument Oil on canvas, 20" x 28", June 1985



Distant Horizons and Joshua Trees Oil on canvas, 34" x 68", June 1989 Joshua Tree Oil on canvas, 22" x 28", August 1986



Mountain Pass Oil on canvas, 52" x 44", July 1991



Pyramid Ruins at a Distant Time Oil on canvas, 29" x 48", June 1998



A Tree in Guanajuato, Mexico Oil on canvas board, 11" x 14", December 2001 Mountains and a Lake Acrylic on canvas, 24" x 30", July 1998

5. ALIEN RUINS

In 1991, Belbruno felt that he needed a personal paradigm shift, so he left Pasadena, California, and moved into a small art studio in St. Paul, Minnesota, where he stayed for nearly six years. *Alien Ruins* is one of the most intense series that emerged from the artist's newly found creative freedom.

This selection of works captures a slice of Belbruno's imaginative inner-psyche. "I was delving into an exploration of my subconscious when I made these works," states the artist, as he contemplates his own paintings. "The Alien Ruins series is a manifestation of an apocalyptic feeling that I had at the time. The isolated, imposing structures represent eroded metallic framework left over from a lost civilization."



Alien Ruins on a Distant World Oil on canvas, 36" x 48", 1995



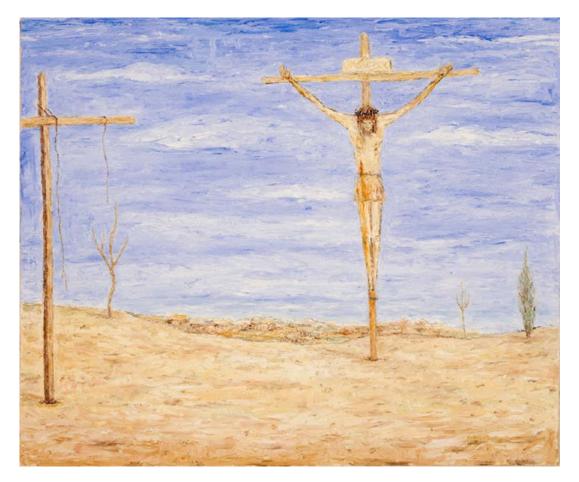
Alien Monuments Oil on canvas, 28" x 36", March 1997



Alien Landscape Oil on canvas, 28" x 36", 1997 Marker Oil on canvas, 28" x 36", April 1997

6. CROSSES AND REDEMPTION

Religion often times seeps into the susceptible minds of children in the form of guilt, suffering, and sin that can easily devour thoughts and consume their sense of purpose or duty in life. Belbruno, who grew up in a Roman Catholic family, notes that he often felt the weight of the world on his shoulders. This series, however, came about at a time of great happiness in his life. "I can't explain it...these paintings were not planned. Depicting Jesus Christ in one of my typically barren land-scapes seems to have washed away some of the burden of carrying a heavy religious load that is ridden with preconceived sin throughout my life. At the time I created these works, the blank canvas was the clean slate that I was not born with, but have acquired through art."



Crucifixion of Jesus Christ Oli on Canvas, 30" x 36", July 2003



Resurrection of a Computer Circuit Oil, circuit board on canvas, 18" x 14", 1997



A Bleeding Circuit Oil on canvas, 48" x 36" inches, June 2008

7. CROWS AND BIRDS

"I tend to paint crows when I feel that my life is precariously balanced," Belbruno states earnestly. In Crow on a Wire, the bird is perched calmly yet conspicuously on a telephone cable charged with electricity. In Crows Over a Barbed Wire Fence, the creatures are shown flying over dangerously sharp barbed wire. Wires, of course, are nearly always strung up between poles, forming crosses. Scarecrow also incorporates the cross along with pointed triangular black flags, and together the works in the series evoke an eerie feeling of prophetic celestial doom. Even the more optimistic paintings suggest a sense of fiendishly macabre apprehension.

The crow itself is an intelligent bird that has been used in literature and art to suggest omens both good and evil. "They are grave and ominous creatures, even when they are friendly," Belbruno notes. In fact, the common crow has a reputation for maneuvering quietly among trees, and swooping down to peck innocent, earthly creatures. These paintings offer an insight into the keen act of looking through the beady eyes of the birds who are always observing, always ready to ruffle up their dark wings and take flight.



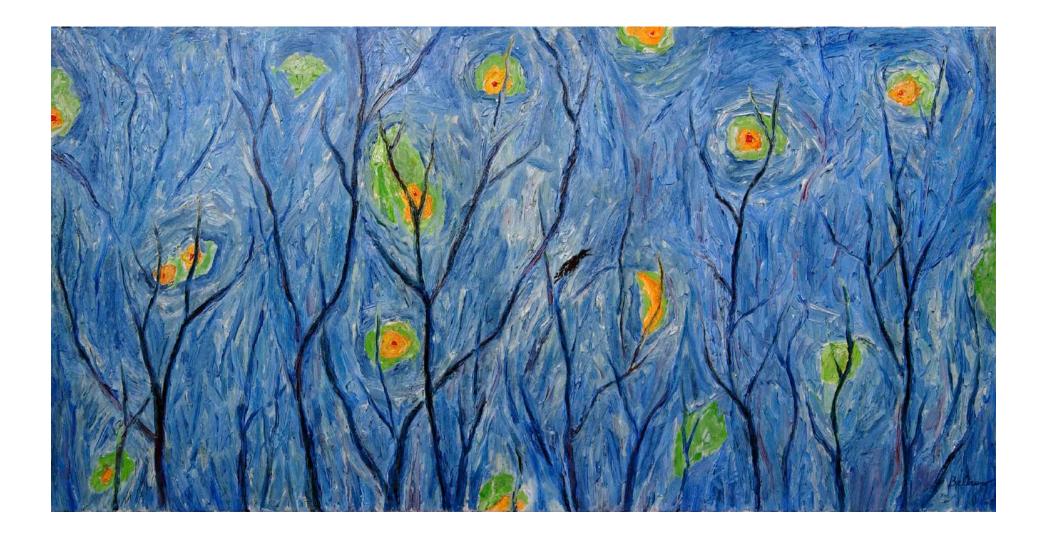
Crow on a Wire Oil on canvas, 22" x 22", April 1989



Crows Over a Barbed Wire Fence Oil on canvas, 28" x 30", March 1990 Lost Luggage Oil on canvas, 24" x 30", September 1987



Scarecrow Oil on canvas, 26" x 34", February 1990



A Crow in a Forest Under a Microwave Sky Oil on canvas, 24" x 48", February 2008

8. CELESTIAL MOON

The Moon tends to play a joyful, optimistic role in Belbruno's work. It casts a comforting light (and the occasional premonitory shadow) onto barren, otherwise dark landscapes. The currents of oil on canvas sweep one into the thick, celestial swirls that make up this series, and the brushstrokes seem to follow a natural gravitational pull, much like the ebb and flow of an ocean's tide. Belbruno paints when he feels compelled to do so. He often buys a canvas impulsively and paints in the most unconstrained, free-spirited fashion. He describes the process of painting *Dreams* as "...a fast, lively, and spontaneous experience." This painting was created with inspiration of a fleeting moment; no waiting, no analysis, no sketch.

As the saying goes, "Sometimes reality is stranger than fiction." This series takes the viewer on a voyage from cheery, celestial dreams to dramatic, chaotic mathematical realities. Belbruno tells the story of the last painting in this series, Orbit to the Moon:

"It is a wholly freeing painting, showing the actual route to the Moon that the Japanese spacecraft *Hiten* was taking—one that I had designed to rescue the mission. The route itself was conceived of in April 1990. On that day, an engineer knocked on my door to describe the desire of Japan to rescue their failed lunar mission and to try and get *Hiten* to the Moon. At that time, the *Hiten* was in Earth's orbit—it was never designed to go to the Moon and was only to be a relay for the lunar spacecraft *Hagoromo*, which was lost in February 1990. The route I found in April of 1990 using my chaos theory (which I was fired for three months earlier) enabled *Hiten* to reach the Moon on paper. It was truly revolutionary, far more efficient than the previously known classical route by the German engineer Walter Hohmann.

In April 1991, Japan fired the rockets of *Hiten*, putting it on my route, which would take five months to reach the Moon. When I made this painting in August of 1991, *Hiten* was there—at the maximum point of the trajectory, 1.5 million kilometers from the Earth. It's a painting in action so to speak. Historically it is very important since it was done by the discoverer while the spacecraft was actually on the route itself.

After I left Los Angeles in September of 1991, I hung this painting to dry in a neighbors condominium, and as I did so, I knew that I was heading into the unknown on a very strange path."





Trees at Night Oil on canvas, 28" x 36", October 1989 Moon Over the Water Oil on canvas, 30" x 24", February 1989



Orbit to the Moon Oil on canvas, 56" x 72", August 1991



9. MICROWAVE RADIATION OF THE UNIVERSE

This series of abstract paintings reflects the penetrative, omnipresent exposure that earthly beings have always lived with, yet have never seen. It is unlike anything else Belbruno has ever created. "I was inspired by the NASA satellite WMAP (Wilkinson Microwave Anisotropy Probe), which gathers subtle fluxuations in the microwave radiation left over from the Big Bang," explains the artist. "The radiation resulting from the Big Bang over 14 million years ago is still lurking about, kindling and provoking a flame of unprecedented abstract expressionism. This radiation is the same as what is used in our ovens and cell phones," remarks Belbruno. "They are optimistic works. You might even see a few figures dancing in the radiant colors."

Microwave Radiation of the Universe was created from an actual map of the Universe; the fiery reds represent the strongest radiation, and blue is the weakest. "The concept and the colors are amazing," says Belbruno. "For a long time, it was too vast for me to imagine painting. I contemplated the idea for two years before making a single brush stroke."



Deconstruction of Christine's Energy Field Oil on canvas, 36" x 18", September 2006



Microwave Radiation of the Universe Oil on canvas, 30" x 15", September 2006



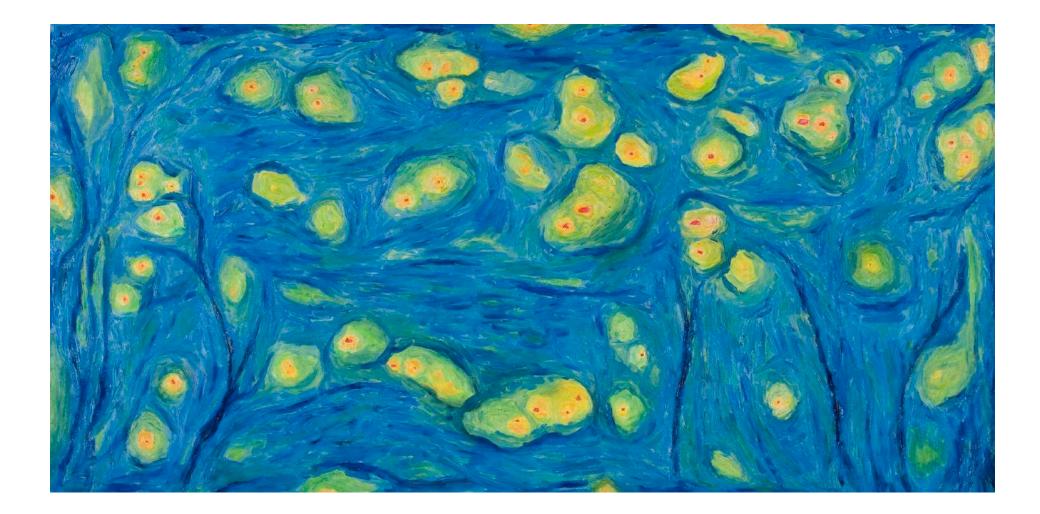
Hellfire Oil on canvas, 30" x 30", November 2006



Microwaves in the Fall Oil on canvas, 20" x 24", September 2006

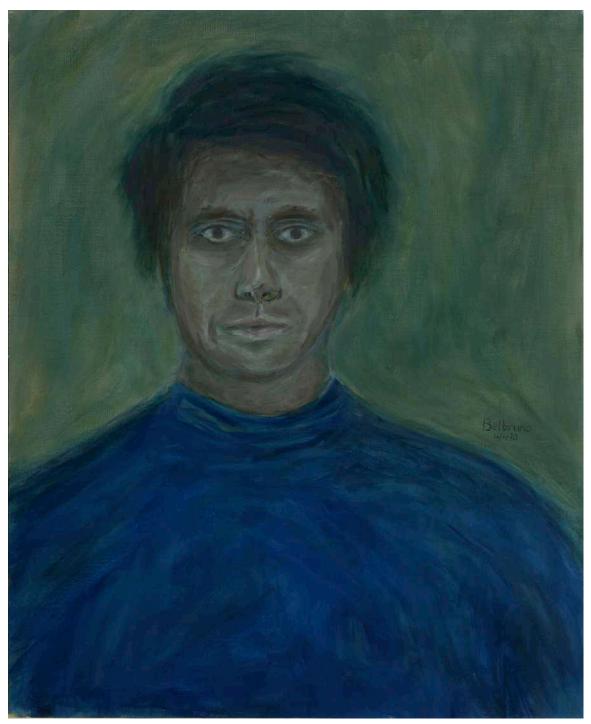


Microwaves in the Sky Oil on canvas, 12" x 9", June 2007



10. SELF PORTRAITS

For a person whose life experiences are brimming full of intensity in realms that expand far into both art and science, it may be initially shocking that Belbruno's depictions of himself are as bleak and barren as many of his landscapes. It is essential to note that his artistic expressions are a reflection of the space between universal complication and clutter. Therefore, even (perhaps especially) in his self portraits—some of which are a contemplation of dark matter and mysteries that taunt (and haunt) the artist—Belbruno uses the canvas to once again reflect his image on a blank slate, similar to the manner of the Crosses and Redemption series. The simple, rather stark backgrounds are not confused with imagery or distracting baggage. In the following works, we see the artist as he sees himself: Belbruno in his universe.



Self Portrait Oil on canvas, 22" x 18", April 1990



My Life in the Rossmor Building Oil on canvas, 20" x 24", February 1994

APPENDIX

Art Statement Edward Belbruno

My paintings strive to reflect sense of a higher reality, which is not solely based on what is visible but also includes aspects that are unperceivable to the naked eye. They frequently involve futuristic landscapes that could exist in another dimensional reality or location in the universe. These landscapes usually depict natural elements, such as mountains and water under deep, black, star-filled skies. Though the subject matter (expansive plains with mountains) is familiar to the viewer, many scenes project disturbing, barren landscapes, often with isolated monolithic structures that have an unearthly appearance. Other paintings display crows and trees that are mystical and unsettling due to the ominous appearance of the trees and the stark ambiance projected by the twilight. The focus of my recent works has been to capture the microwave radiation left over from the big-bang creation of our universe. In these pieces, I like to use richly textured splashes of intense, electric colors, containing subtle, hidden images which reward a keen viewer who looks at the painting in-depth.

My life as a mathematician and scientist is dedicated to understanding how objects move in space in a manner where chaos occurs, and my theories have given rise to a new approach to space travel. However, my life as an artist is entirely different, despite the related subject matter. It is through art that I am able to access a wholly different part of my mind. Instead of taking a logical, mathematical approach, I completely let go, allowing my inner-self to guide me though the creative process, which can appear to be random. In order to bridge mathematical and artistic worlds, I use a variety of artistic styles in my paint-ings.

If a viewer were to look at my paintings in chronological order, they would notice a progression of themes and distinct styles that correlate to my confidence and flexibility. This process began with a tightly-defined painting style with little texture and scenes that are were carefully painted in a realistic manner. Gradually, my style became more flexible, becoming much looser and including a lot of color and texture in its expression. My later works allow the viewer to easily see individual brush strokes. A viewer who follows my work chronologically will notice that, thought some keystone themes are constant, the style changes. For example, Starscapes are prevalent in my work, and they appear in numerous, altered forms, depending on the period in which they were painted. In the Black Night Series, painted initially 1984, then again in 1999-2000 and 2005, the starscapes are peaceful and mystical, in harmony with the depth of the rest of the painting. In later works, viewers will notice that the starscapes have become textured; the style is expressionistic, loose in nature, and bolder in its use of colors, which portrays swirling images of the universe. In some pieces, mainly after 1998, the impressionistic landscapes in my paintings describe scenes I have encountered during my childhood in Connecticut, or through my travels in the US and Europe. In a series from the mid-1990's, I painted surreal, barren landscapes with a few monolithic relics or trees stripped of leaves or small branches. One such group of paintings, entitled "Alien Landscape Series," exudes an apocalyptic feeling and represents eroded metallic structures that are left over from a lost civilization. Another, related mixed media painting ("Resurrection of a Computer Circuit"), shows a computer circuit on a cross. This piece tends to fascinate viewers because of the use of an actual computer circuit mounted on an iconic cross in a classical setting, which seems out of context. I also did a series of selfportraits from 1990-2003 reflecting different periods my life.

I am especially fascinated with the moon, which I frequently paint into my works. It has always appeared to me as a magical place. "Route to the Moon," painted in a loose, expressionist style, shows an orbit in space that travels from the Earth to the Moon. This is based on my work as a celestial mathematician, when I devised a new way to travel to the Moon using chaos theory. I was able to discover this route through the process of making a pastel sketch. It was actually used in 1991 to rescue a Japanese robotic spacecraft and bring it to the Moon.

My newest series has taken a drastic change towards abstract expressionism in order to portray a fascinating concept that I have only recently been able to translate onto the canvas: microwave radiation. This radiation is left over from the big-bang that created our universe about 14 billion years ago. The radiation has permeated the universe ever since and it is still lurking, passing through every being on earth. I believe that our subconscious minds may even have a deep memory of these waves, starting with our evolution on this planet. This group of paintings, referred to as the "Microwave Series," was initially inspired by images from a NASA spacecraft, WMAP (Wilkinson Anisotropy Probe), which was the first to record these waves in 2003. The radiation patterns are painted in vibrant shades of red, green, yellow, and blue. These paintings also contain subtle mysterious entities which seem to be dancing within the patterns. One of my favorite pieces, "Cosmic Fireflies," shows ghostly branches of trees projected on the cosmic scene in addition to the hidden figures. This painting is the largest of the series, and, unlike the others, strives to bring out treelike patterns, bodies of water and figures within the scene.

In sum, my paintings reveal an evolution in style and thought with regards to art, mathematics, and science. I am continuing work on my paintings in the Microwave Series and am currently immersed with a grandiose project that will be a 20-40 foot long representation of the universe, with emphasis on trees and the hidden entities. I am also completing an installation in this series composed of 16 small pieces. I anticipate that these completed works will exhibit a looser abstract style where the paint may be dripped onto the canvas in many interwoven layers in order to represent the different layers of reality.

It is my hope that viewers will feel and appreciate both the intellectual and emotional intensity with which I paint. My artistic expression stems from personal experiences relating the nature of reality within the vast, mysterious space, which we ultimately use to attribute meaning to our existence. As a mathematician and artist, I wish to exude both the chaos and the order that is contained in every seemingly random splatter of paint to the big bang, the universe, and even to life itself.

Biography Edward Belbruno

I was born in Heidelberg, Germany and was raised in New London, Connecticut. I have always been interested in space, and this was seen in my first oil painting at 12 years old, which was of a landscape on the satellite Titan of Saturn. I took painting courses at Mitchell Junior College (New London) during my sophomore year and a few lessons after that. However, I am largely a self-taught artist.

My first art exhibition was sponsored in 1971 by Mitchell Jr. College, as part of a group show. I continued to paint while I attended New York University, where I received my BS (1973) and MS (1975) degrees. During this time, I completed my first significant painting. My degrees were not in art, but in the field of mathematics as it seemed to be a more practical career choice at the time. I put a career in art on hold while I received my doctorate in mathematics from New York University in 1980, specializing in celestial mechanics. I taught mathematics at Boston University for a few years, until, rather spontaneously, I was driven to paint again and created a series of works in 1984 that would start to define the direction of my life as an artist. These pieces comprise a series of starscapes which constituted the start of my first art portfolio.

I left Boston University in 1985 to pursue work at NASA's Jet Propulsion Laboratory in Pasadena, California, where I designed pathways for a robotic spacecraft to Jupiter and beyond, I also continued painting during this time and found Los Angeles to be a stimulating environment for doing artwork.

In 1990, I began participating in gallery exhibitions internationally:

- My first significant art exhibition was as an American representative to an international exhibition, Paris, October 24-28, 1990. This exhibition was sponsored by Artists a la Bastille, the largest society of artists in Paris at that time, and by the Societe des Auteurs des Arts Visuels, affiliated to the Picasso family.
- Solo exhibition, Tah Gallery, Los Angeles, July12-August 1991
- Solo exhibition, Harvard Divinity School, Cambridge, Massachusetts, October-November 1991
- Joint exhibition, sponsored by Alenia Spazio, Imbianchini building, Turino, Italy, June-July1992

In the Fall of 1991, I settled in St. Paul, Minnesota, living and working full time in my art studio. I participated in many exhibitions in the St. Paul-Minneapolis area, including:

- 12 studio exhibitions, St. Paul Art Crawl, sponsored by the city of St. Paul, St. Paul, Minnesota, 1992-1998. Each year, an exhibition was held in the Spring and Fall. My studio was in the Rossmor Building.
- Personal Perspective & Stellar Visions, a large solo exhibition sponsored by the Lutheran Brotherhood, located at the Corporate Headquarters skyscraper lobby. This exhibition featured 40 of my paintings, Minneapolis, June 1994
- Group exhibition, Express Yourself, sponsored by Landmark Education, Minneapolis, November 16, 1997 January 31, 1998

I settled in Princeton, New Jersey in 1998, where I continued to paint, and also became affiliated with the mathematics department at Princeton University. I continued to have a number of art exhibitions, including:

- The Director of NASA, Daniel Goldin, commissioned me to do a painting for NASA's executive collection in Washington, DC at NASA HQ in 1999. He personally unveiled it at a ceremony in Washington, DC on November 13, 2000. My painting hangs with works by Warhol, Rothenberg.
- Solo exhibition, pen & inks, sponsored by the University of Rome, Rome, Italy, November 2004
- Solo exhibition, sponsored by WilmerHale, 1875 Pennsylvania Avenue, Washington, DC, July 18, 2003
- Solo exhibition, Mitchell College Library Spring Art Exhibition Series, 30 paintings, New London, Connecti cut, April 29-May 2004
- Permanent display of two paintings at Princeton University, Astrophysics Library, starting in April 2006
- Solo Exhibition, watercolors, Schenck Gallery, 40 rue de la Roquette, Paris, July 2006
- Group exhibition, Vernissage, Hosted by Image Arts, Princeton, New Jersey, November 3-10, 2007

I have published many scientific papers in the fields of mathematics, astronomy and engineering, and two books with Princeton University Press (2004, 2007). The latter book is entitled Fly Me to the Moon: An Insider's Guide to the New Science of Space Travel, and is for a popular audience. Images of my paintings were used on both these book covers, as well as two proceedings volumes I edited, published by the New York Academy of Sciences. Many popular articles on my scientific work have appeared the magazines: Discover, New Scientist, Science Digest, American Scientist, Astronomy, and I have appeared twice on NBC's Today Show. In September 2007, New Scientist magazine placed me on a list of the top ten space thinkers in history.

In 2007-2008, two articles were published, featuring my artwork:

- Wild River Review, Colors of the Universe: Ed Belbruno Talks About Microwave and Art, by Joy Stocke, January 2000 (www.wildriverreview.com/spotlight_belbruno.php)
- Space Life Style Magazine, Canvas of Reality: Ed Belbruno's Parallel Lives, by Lois Elfman, Fall 2007 (www.spacelifestylemagazine.com)

Listed by the Artist Rights Society of New York (ARS) as one of their most frequently requested artists (top 200 artists out of 30,000). This list includes Picasso, Miro, Pollack, Chagall, Munch, Warhol, Dali. (see www.arsny.com/requested.html)

BELBRUNO'S UNIVERSE

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