

$$\Psi = A \sin \frac{\sqrt{2mE}}{\hbar} x + B \cos \frac{\sqrt{2mE}}{\hbar} x$$

$$H\Psi = E\Psi$$

$$\sum_n i_n = 0$$



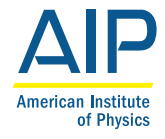
2016 Quadrennial Physics Congress

ART ABSTRACTS

Unifying Fields

Science Driving Innovation

November 3 - 5, 2016
Hosted by Sigma Pi Sigma, the physics honor society



November 4-5 - Harbor Room A

1 Caroline Bowen, University of Tennessee, Knoxville, *Asterism*

"Asterism" depicts the seven stars of the Big Dipper as they are positioned relative to each other in space, suspended in place by metal rods anchored to the edges of a cube. While the distances between the stars are shown to scale, their sizes are not. When viewed head-on from the front, designated by a dot on the top left corner of the cube face, they form the Big Dipper as it is seen from earth, but as the viewer walks around the sculpture, the familiar pattern quickly dissolves into a seemingly random configuration. The flat black metal frame emphasizes how as physicists, we view and quantify nature through a lens of rigid, unnatural human constructs like bounding boxes and coordinate systems. This is in stark contrast to stars themselves, which are inherently organic objects with messy births and deaths, finite lifetimes, and unique chemical compositions. For this reason, I chose to represent them as wooden beads that have been stained white (with a subtle hint of each individual star's color), allowing the wood grain to show through and give them a suitably organic texture.

2 Bethany Campbell, University of West Florida, *Refract the Cat*

Refraction of light in the water causes the cat to appear distorted, with a sort of lopsided Cheshire smile as she peers through the glass.

3 Bethany Campbell, University of West Florida, *Rainy Day*

Taken with an iPhone 4 during a walk on a cloudy, drizzly day at Fort Pickens in Escambia County, Florida. While walking over a small footbridge, a couple of turtles swim to the surface. As raindrops lightly fall around them, the spherical wavefronts from the raindrops hitting the surface of the water spread out and pass through each other. The cloudy sky is seen reflecting off the surface of the water.

4 Bethany Campbell, University of West Florida, *Do you see what I see?*

While sitting in my car one day with the sun shining on the side of my face, I noticed that I could see my eyes reflecting off the interior surface of my sunglasses – so vivid, magnified, and clear that I could count each individual eyelash, bump, and pore. At certain angles, the sunglasses either transmit almost all of the light resulting in almost complete transparency (upper right) or reflect significant enough amounts of light to act as a mirror (lower left). The image is inverted and small when the object is relatively far away from the lens, but upright and large when the object is close to the lens (lower right). The eyelashes, iris, and sclera can be seen reflecting from the interior of the lens in the lower right picture. The ability to capture the reflection on camera is limited – next time you are outside and wearing sunglasses (with the sun approximately perpendicular to your profile, it needs to illuminate your face), try to find your eyelashes in the reflection! The magnification is outstanding.

5 Bethany Campbell, University of West Florida, *Foreshadowing*

Panorama shot with an iPhone 6 at the University of West Florida, in Pensacola, Florida on February 3, 2016 – 20 days before the tornado outbreak of February 23-24, 2016, during which an EF3 tornado ripped through this zip code. Atmospheric physics is a branch of physics that does not get much recognition. This is a picture of a thunderstorm with torrential rains moving in during sunset.

6 Bethany Campbell, University of West Florida, *Distortion of Two Varieties*

This photograph was taken from afar with an iPhone 4 at Baytowne Wharf in Miramar Beach, Florida at sunset. The shadow of the heron's head and neck are distorted by the waves, appearing much more slender than in reality.

7 Laura Goodman, North Carolina State University, *Iridescent*

The American Physical Society sends weekly news briefs to keep physicists up to date on all sorts of physics research. On April 13th, 2016, a news brief titled "How tropical birds use quantum mechanics" sparked my interest in quantum physics. As the article explains, tropical birds such as the hummingbird in this painting get their iridescent colors from more than just colored pigments in their feathers. Rather, this iridescence comes from light interacting with quantum bands much as electrons do in condensed matter physics.

This painting attempts to capture this mathematical and natural phenomenon. Behind the iridescent hummingbird is a magnified view of these feathers. Farther into the painting lies an artistic interpretation of this physics phenomena. Northern lights represent different band gaps and the different size curves hold for the different wavelengths of light. As the curves intersect they may add or cancel in the gaps just as the actual light waves interact. Overall, this painting is a reminder of the physics that creates so much of the beauty we see in the fluttering hummingbird."

8 Luke Haase, CU Denver, *Purple Mountain Majesty*

This piece brings the mind to new frontiers, other worlds, other solar systems, other galaxies. In the foreground we have a lake inspired by heart crystal geyser in Yellowstone WY, a place special to the muse this was painted for. At the base of the mountains we have some green, maybe some happy trees or, maybe there isn't atmosphere to support trees so it must be jade or emeralds. Then we have mountains inspired by the Maroon Bells CO, with simple water snow caps or possibly a deposition of atmosphere (CO² ice). Working further back, we see some planets that can (by those that are familiar with the artist) be recognized as foregrounds from other works by the artist. Even further back, we see a familiar looking milky way of the galaxy this planet lives in. The very background has hints of red and blue as if you can almost see the Cosmic Microwave Background Radiation.

Referred to as "The Cosmic Bob Ross," Luke Haase's work mixes and spins classic painting techniques in new and imaginative ways."

9 Brittney Hauke, Coe College, *STEAM*

For the past few semesters I have worked on trying to intersect my physics and art interests in a more direct way. Now instead of just focusing on the surfaces, my forms also represent shapes related to science, like domes and parabolas. The surfaces have been covered in black slip and inscribed with either physics equations or constellations, general themes one can find in science. While the constellations will be more recognizable to the average person, the equation pieces take a more specific knowledge. The patterning of the equations also gives them an abstract quality. These pieces could be considered functional, but I am striving to expand my work into the sculptural realm. I am preparing for my senior art show in the coming months and some of these pieces may be displayed again.

10 Kate Miller-Chell, University of Wisconsin - River Falls, *Formation of Self*

Science is about discovery and immersion, it has the greatest effect and you learn the most when it has a personal meaning to you. For me, the thing that has always driven my discovery is learning about the planets. When I was young, my father and I used to go out and lay in the grass staring into the night sky trying to pick out planets from the stars. I pulled inspiration from these nights and instilled the experiences into my painting. The girl in my painting represents a early solar system. She is the center mass of the system and as she exhales she breathes life into new planets and solar systems. Each creation is another opportunity to experience the feeling of discovery and to immerse yourself in learning. It's the same feeling whether you love gazing into the sky, exploring the depths of the oceans, or searching out another species. The painting is meant to represent the learner in all of us.

11 Salvador Montes, California State University Stanislaus, *The Apple*

Throughout the centuries, much progress have been made in expanding the knowledge of the universe. Here, a brief summary of the history of physics is depicted as a falling of an apple. As the apple falls, it leaves behind the rich history and great discoveries made in the field of physics. The apple it self is a representation of one of the great physicist, Sir Isaac Newton, and his three laws of motion.

12 Salvador Montes, California State University Stanislaus, *El Suenno de una Particula*

Particle physics and astrophysics are unified as subatomic particles from a collision fly around and form stars, solar systems and galaxies. This piece represents the importance of understanding the particles, as they are the ones that make up all that is seen in the universe. Also, it is a depiction two possible routes for aspiring physicists, working in particle physics or astrophysics, but presented as if they were dreams from a young child.

13 Asha Nagaiya, University of Louisville, *Remember*

Remember is a digital art piece that represents how we view the universe. I study astrophysics and the field is so vast, both metaphorically and in size itself, that sometimes I think we get caught up in the details. Perhaps we don't see the solution to the question at hand, or we don't even know the question to ask and we feel as there is a veil over our knowledge and understanding. We, as scientists, just have to remember to use the tools of mathematics and reasoning as well as perseverance and creativity to understand the beautiful world around us...here on Earth and beyond into the [yet] unknown.

14 Jordan Rice, Carthage College, *We are all made of starstuff*

In this piece, I wanted to bring together science and art in a way that would symbolize the Earth's place in the universe. At a deep level, I believe that all humans know that the Earth is but a small piece in a much larger universe, but need to be reminded of exactly where we are and where we came from. By bringing together multiple aspects of art (painting and photography), I wanted to convey this to every person.

15 Samantha Spytek, Virginia Polytechnic Institute and State University, *The Forgotten 13th*

Astrology may not be a science yet the constellations it uses are real, albeit now considered sections in the sky rather than just the imaginary forms that past civilizations created by connecting the stars. The Sun's ecliptic is a path that passes through certain sections of the sky each year. The constellations that lie along this path constitute the zodiac. There are twelve constellations in the traditional zodiac, which is said to influence a person's life. Not only does astrology not stand up to scientific scrutiny, but it also ignores the 13th zodiac, Ophiuchus, the Snake Bearer. The sun actually passes through this constellation during the first part of December. So in memoriam of this forgotten zodiac, I drew the Snake Bearer contemplating his eternal foe as a star passes through his constellation.

16 Maria Stone, San Jose State University / NASA, *Family of Science and Art*

I am studying Physics and my husband holds an MFA in Digital Media Art. We influence each other and learn from each other. We enjoy science and art as a family. This is a collage of what we find interesting and what we find inspiring when we go places, from gorgeous museums in Paris and Washington DC, to National Wildlife Refuges, to NASA, to BioArt, to engaging conversations and seminars about Science and Art. We hope to share our excitement about these fields with the audience, and maybe inspire others to explore the amazing things around us.

17 Graham Van Goffrier, University of Maine, *Raytraced*

Four protons, fused in abundance,
Released their potent energy,
Which thermalized to 'normal' light,
Will pierce the surface of the night,
And settle calmly on their way:
Eight minutes twenty seconds.
To us perhaps, a normal day,
But only one this ray will see.
Defined by probability
And scattered just as Rayleigh said,
To cast the sky in purest red.
Clouds marbled by convective flow,
May note the image laid below,
Whose turbulence distorting size
Is no less pleasing to the eyes.
But ray this is the journey's end,
Each interface and spatial bend
Has coalesced to bring you here;
Though incoherent you are dear.

18 Sachithra Weerasooriya, Midwestern State University, *Self Paradox*

Since the beginning of mankind we have always sought to stay young by improving healthcare. But, is there any other way for us to be young? Suppose I travel to a distant planet with the speed of light and then turn around hundred and eighty degrees and come back to earth. Time in my frame would tick slower compared to earth's frame of reference. Hence, I would be much younger than someone never travelled to space. This piece of art contrasts and compares myself as one who has travelled through space and as someone who has not, thus reflecting the twin paradox.