The Quantum Sculptor

Julian Voss-Andreae, Portland, OR
Sculptor

I have always loved reading popular science magazines. But I really got hooked on physics after reading Roger Penrose’s amazing book, *The Emperor’s New Mind*.

I had moved from my hometown, Hamburg, to Berlin in Germany, with the plan to study painting, but this book gave me my first real glimpse of quantum physics. Deeply fascinated, I decided to find out as much as I could about the subject by studying physics at the Freie Universität Berlin. Later, I moved to Vienna, Austria, for my graduate thesis work with Anton Zeilinger, probably best known for the first realization of quantum teleportation.

In Vienna, I participated in the setup of a new type of experiment, one that was actually first suggested by Roger Penrose. We sent carbon-60 “buckyballs” through a double-slit experiment in 1999, recording a clear diffraction pattern and demonstrating that a single buckyball (or, more accurately, the entity that is later detected as a single buckyball) goes through two openings at once—two openings a hundred times farther apart than the diameter of one buckyball. Our buckyballs were the most massive particles ever probed for wavelike behavior.

Although fully committed to physics at the time, I had never given up on the idea of making art again one day. Shortly after the Vienna experiment, I attended a confer-

ence in Cortona, Italy, for scientists who wanted to explore the arts, humanities, and spirituality. One speaker, George Weissmann, especially fascinated me with his talk, “Quantum Physics and Parapsychology.” His daughter, Adriana, would exert an even stronger influence on me, compelling me soon after to move to Portland to be with her.

I felt the urge to return to art, bringing with me what I had learned and experienced in physics. I enrolled in an art school, with a focus on sculpture, and soon found myself making sculptures based on the structure of proteins, the molecular building blocks of life. Last month I installed the latest such protein sculpture, a 20-foot stainless steel and colored glass piece based on the structure of the human collagen molecule, at Rutgers University in New Jersey.

A different body of my work draws inspiration directly from quantum physics to create novel sculptures. The 2009 exhibition “Quantum Objects” at the American Center for Physics in College Park, Maryland, was devoted solely to this body of work. One of the first sculptures in this series, “Quantum Man,” envisions a walking human figure as a quantum object.

Today I am working on a large-scale commission based on a similar idea for the University of Minnesota’s new Physics and Nanotechnology Building in Minneapolis. Two monumental figures, a kneeling man and a woman each 10 feet tall, face each other on a plaza over a distance of sixty feet. They are fabricated from parallel slabs of steel arranged in such a way that the figures almost disappear from view when the viewer crosses through the line of their gaze.

I am also part of a team that recently won a $2 million National Science Foundation grant to develop cutting-edge nanomaterials built from DNA. My part is to find ways to visualize the nanostructures we are going to build in the lab as macroscopic sculptural objects. This project is my first real science-related work in over a decade, drawing on my experiences both as a scientist and as an artist.

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**The Singer**

**Renée Yoxon, Montreal, Quebec, CA**

**Jazz Vocalist, Teacher, and Writer**

When I was 15 years old I dreamed of being a scientist by day and a jazz singer by night. I attended Carleton University from 2005 until 2010, where I studied experimental physics. In my free time I took private voice lessons with Tena Palmer in the music department and played in a community big band.

In the beginning music always seemed to be a frivolity, something one couldn’t make a career of. I diligently pursued a physics career, working every summer at the Canadian National Research Council’s Institute for Chemical Process and Environmental Technologies department. I studied optical methods of measuring polycyclic aromatic hydrocarbons in ambient conditions. Though I had a really good time working with the scientists, as each summer went by I spent less time thinking about research and more time thinking about music, performance, and song writing.

In my fourth year I met young professional musicians for the first time, which changed my whole perspective. Once I realized music could be a viable career option, I knew that I had to make some changes. I switched out of the honors experimental program and into the general physics program, which freed up a bunch of credits. For the last two semesters of my degree I didn’t take a single science or math course. I loaded up on music credits and ended up graduating with a different approach to science-related work in over a decade, drawing on my experiences both as a scientist and as an artist.
a BSc in physics with minors in math and music.

Although studying physics may have started me off behind my musical peers, my Carleton experience prepared me excellently for the self-employed life. To complete my degree I had to be resourceful. My time as a teaching assistant gave me the teaching bug. I now have a thriving voice teaching studio. As president of the Carleton Physics Society, I learned that I have a knack for event planning and advertising. And I don’t want to leave out that I am still friends with many of my physics classmates, and they have continued to support me and my music.

Now that 10 years have passed since my teenage career aspirations, my new dream is to be a successful musician and a lifelong artist. But I still got excited when the Mars rover landed!

As an undergraduate at Michigan State University in East Lansing, I did an observational senior thesis focused on extragalactic background light. Graduating in 1994 with a degree in astrophysics, I attended the University of California, Santa Cruz, where I studied galaxy formation and evolution; in 2000 I earned a PhD for my work studying high-redshift galaxy clusters drawn from the Las Campanas Distant Cluster Survey.

Partway through my graduate studies I decided that I didn’t want to pursue a traditional academic career in astronomy. The primary reason was simply that I didn’t enjoy research enough to want to make a career of it. Other important factors in my decision related to quality-of-life issues. I felt that astronomers, especially postdocs and young faculty, were expected to work long hours to produce an unreasonably large amount of research for relatively low pay, usually with little to no say in where they lived.

Leaving academia, I embarked on a new career as a software engineer, creating video games. As a child, I always loved programming computers and playing video games. That lifelong affinity, coupled with my extensive knowledge of physics and mathematics, gave me the foundation to become a successful programmer. Although I didn’t have many directly transferable skills (I programmed in Fortran in graduate school and had to learn C++ afterward), my graduate studies in astrophysics helped me develop my most valuable asset—being an independent learner and problem solver. Even though I had almost no direct knowledge of how to make games and faced a steep learning curve, I picked things up quite quickly and wasn’t afraid to just dive right in.

After several years working on console games, I am currently a lead software engineer for Disney Interactive Worlds. My team is bringing Club Penguin, a popular kids’ online virtual world, from the web to mobile devices running iOS and Android. I love working in a creative, collaborative field with smart, talented people who are passionate about games. My job is a wonderful combination of coming up with ideas to solve technical problems and executing those ideas. My company places an emphasis on work–life balance, which is really important to me. We do work extra hours sometimes during “crunch time,” but that happens infrequently.

I still keep tabs on what’s going on in astronomy, but predominantly through the mainstream news outlets, not through any academic or professional channels. My best friend is an astronomical lecturer at Griffith Observatory, and he keeps me in the loop as well. I’ll always love learning about physics and astronomy, and am so thankful for the knowledge I have and the invaluable problem-solving skills I gained because of it. But learning about a field and conducting research in that field are two very different things. I couldn’t be happier with the career choice I made to be a video game programmer.