

# Linda Cover / David Lederman

Linda Cover- Proverbial Artist's Roller Coaster Ride:

“WOW!” Proverbial Day 1: “I got to visit David's Sci-Fi lab...no test tubes, but lots of pipes and aluminum, wires and shiny objects, (I felt like I was on a movie set). This is a research lab that explores "fundamental properties of materials in reduced dimensions". I am such a novice in this world of physics... I tried to take in the nanoscale projects that point the way to address future electronic devices, and I must admit, I felt like an awestruck tourist. As a photographer, I can easily photograph all the wonderful physical landscapes I saw at this facility; I was a kid in a candy store, photographically speaking, but this work is actually conceptual, with the physical trappings, so I want to do David's work justice by creating pieces that visually depict the concepts of what I am able to understand about this research. “

“OH GEEZ! !” Proverbial Day 2: how do I depict nanostructures and wild interfacing? Abstract shapes and colors? Assemblage? Slide loop? Wax? Recycled garbage? Aluminum foil? Transformative crystals? Flowers? Surreal marble statuary? Shiny objects? how many LED lights would I need!! OMG! Where do I begin!

“REACHING FOR STRAWS” Proverbial Day 3: I read your website, articles you published, could you also send me your notes you scribbled over coffee?

“EUREKA!” Proverbial Day 4: OK... Got it!! 2 Sandwiches & Hamburger!.. Lightning Bolts.. Crystals.. Graphene.. Apples.. Bananas and Cats (dead and alive) ! ...Thank you Andy Warhol. “POW”

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“Regarding the cats, would it be possible to have a mixture of “live” and “dead” cats? For example, some of the cats could be running, and some of them could be, I don't know, feet up?” - David Lederman

“Of course some of the cats can be dead!! I will put some dead cats in tomorrow.” - Linda Cover

Here is my description of Linda's artwork from a scientific viewpoint:

1.Schrodinger's Cat: The scientific work relies on the principles of quantum mechanics which govern the behavior of electrons. Schrodinger's cat illustrates the fundamental quantum mechanical concept of entanglement, where a particle (the cat) can be in two states at once (dead and alive) until its state is measured. In this work, an interface between two materials (the middle of the

sandwich) creates interactions between electrons and between electrons and their nuclei that result in new quantum properties, such as magnetism. These interactions can be modified by applying voltages (lightning bolts) which in turn cause the magnetism to turn on and off.

2. Hamburger: In this hamburger, a voltage across it creates magnetism at the interface, symbolized by the compasses. Under some circumstances, the laws of physics dictate that these special electrons (the compasses) live on the edges of the sandwich and that their intrinsic magnetism (spin) points in a specific direction.

3. Submarine sandwich: The properties of the interface electrons in this submarine sandwich change because the sandwich forces the crystalline structure at the interface to change when the atoms from the different layers try to "fit" with each other. The electrons sense this change in structure, which in turn causes their magnetic and electronic properties to change. For example, if the top and bottom of the sandwich do not conduct electricity, it is possible that the interface will be electrically conducting because of the change in structure. This is measured by applying voltages and measuring the current; normally, the current would be zero in either of the two materials (top & bottom buns), but when put together, the interface (the meat of the sandwich) conducts electricity.

Although I am by no means an art connoisseur, I still remember as a young child going to see a David Hockney exhibition on a school field trip. The impact that Hockney's pop-art had on me was profound; I didn't know that everyday objects could be viewed as art! I have also been to the Andy Warhol museum in Pittsburgh a few times, and I'm a big fan of his as well. I was therefore very pleased when Linda proposed a pop-art theme, even though she did not know about my secret art interest (play the theme to “The Twilight Zone” here). Linda's pieces capture the essence of my physics research interests using pop-art imagery in a concise, efficient and, dare I say, beautiful way that I hope a lay person will appreciate. This collaboration has also made me think more deeply about my research in terms of finding new ways to instill magnetic and electronic functionality at interfaces, for example, by creating finite nano-scale geometries (like the submarine or hamburger sandwiches depicted in the art pieces). Perhaps the art will beget scientific inspiration, thus completing the circle.

I am grateful to have had this opportunity to collaborate with such a talented artist. Thank you, Linda!