

**Jennifer Cano, PhD:**

My proposal is on engineering quantum materials to realize novel phases of matter. Matter – so let me break that down. You're familiar with phases of matter such as liquid, solid, gas, and within a solid, you can be a metal or an insulator. And within a quantum solid, there's even more possibilities. I'm interested in a particular phase of matter which is called the topological insulator. And it can conduct electricity without dissipation. That's to say that it doesn't have any heat loss. It doesn't have any energy loss when it conducts. That makes it a perfect conductor. And you can imagine that this would be very useful for future energy efficient technology. The problem is that it's hard to find materials to realize this phase of matter. And so we're going to take a different approach. Our approach is to engineer this phase by building it from known ingredients. So I'm a theorist. What we have done is derive an algorithm that will help us search through known materials, so that we can figure out how to combine them to build the topological insulator. And so we're going to interface our algorithm with a database of 2-D materials, and the result will be many new predicted topological insulator materials. We can share our predictions with our experimental colleagues who can test them in the lab, and the result will be a backbone for the next generation of energy efficient electronics.