



Department of Physics and Astronomy
FALL 2021 Colloquium Series - Virtual

“Quasi-2D Superfluid ^3He ”

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The third law of thermodynamics states that the entropy of a system must go to zero as the temperature approaches zero. Hence as they are cooled, gases condense into liquids, and liquids freeze into solids. But what happens when quantum mechanics prevents a liquid from freezing due to its zero point motion? The answer turns out to be a superfluid. We know of only two superfluids that form from liquids at ambient pressure: the two isotopes of helium, ^3He and ^4He . The ^4He atom is a boson and hence can readily Bose condense into a superfluid, but what happens to ^3He atoms since they are fermions? It turns out that ^3He atoms pair up before turning into a superfluid, much like the electrons in a superconductor but with some exciting differences. In this talk, I'll tell you about the physics of superfluid ^3He , and our work on confining it to two dimensions using nanofabrication techniques. This confinement is predicted to lead to a new superfluid phase that is a “superfluid crystal”. What is a superfluid crystal? I'll tell you all about it.

Thursday, Sept. 30, 2021

4:00 - 5:20PM

Talk will be via Zoom - contact physics@csus.edu for links or visit our Colloquium Spotlight at www.csus.edu/physics

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