SACRAMENTO STATE

Department of Physics and Astronomy

SPRING 2022 Colloquium Series

“The Role of Mechanics in the Gut-brain Axis”

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Sac State Physics & Astronomy

Although we may not give it much thought in our everyday lives, our bodies are host to a wide range of bacteria. These trillions of bacteria are critical to human health and development, sometimes in surprising ways. The bacteria in the human gastrointestinal (GI) tract, the so-called gut microbiome, have co-evolved with the host to form a symbiotic relationship and is an essential component of human health and healthy development. A growing body of research has revealed an intricate reciprocal relationship between neuronal development and the gut microbiota, in which changes in neuronal development affects the gut microbiota and vice versa. However, the role of the biophysical properties of the gut in this so-called gut-brain axis is poorly understood. In this talk, I will discuss experiments quantifying the mechanical properties of intestinal tissue from a fruit fly model system carrying an autism spectrum disorder-related risk gene mutation. Our results show that mutant flies exhibit changes in both their gut microbiome and organism behavior, compared to control flies. Interestingly, our mechanics measurements revealed changes in the mechanics of the mutant fly gut, both in terms of the strain stiffening behavior and overall elasticity. Our results support the idea that gut tissue mechanics may play a role in the gut-brain axis paradigm, and future work will further explore any reciprocal relationship between gut mechanics, the microbiome, and neuronal development.

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4:00 – 5:20PM

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