



The University of Texas at Austin  
**Department of Physics**  
*College of Natural Sciences*

## Colloquium

Wednesday, January 31, 2024  
John Archibald Wheeler Lecture Hall  
PMA 4.102, 4:00pm

*Adventures in particle physics at small and large distances*

**Prof. Can Kilic**

**University of Texas at Austin**

### Abstract

Despite the enormous success of the Standard Model (SM) of particle physics, a number of profound questions about the universe remain unanswered. In this talk I will describe how theoretical particle physicists take on these challenges in general, and some of the promising directions for extending the SM that I have worked on during the last few years. Specifically, I will describe dark or hidden sectors containing new physics, coupled to the SM via so-called “portals”, or possibly through gravity only. I will go in more detail into three models where the first two interact directly with the SM via portals and they aim to address puzzles such as dark matter, the matter/antimatter asymmetry, and the naturalness of the Higgs sector. The third model will be an example of a dark sector that interacts only gravitationally, which can address open questions in cosmology such as the tension in the measurements of the Hubble parameter, which may be providing us with the earliest evidence that the Lambda-CDM model of cosmology needs to be extended just like the SM.

**Can Kilic** obtained a bachelor of science degree in physics at the Bogazici (Bosphorus) University in 2000, and a PhD degree at Harvard University under the supervision of Nima Arkani-Hamed in 2006. He held two postdoctoral positions, at the Johns Hopkins University until 2009 and then at Rutgers University until 2011. He became a faculty member in the Theory Group at the University of Texas at Austin in 2011 and he was promoted to associate professor with tenure in 2017.

Kilic's research is focused on extensions of the Standard Model of particle physics with an emphasis on experimental and observational signatures. Specifically, he works on model-building, collider physics, particle astrophysics and early universe cosmology.