

## Department of Electrical and Computer Engineering



TEXAS TECH UNIVERSITY

Edward E. Whitacre Jr.  
College of Engineering

### Spring 2026 Seminar Series

**Seminar Title:** *Light Echoes Around Supermassive Black Holes: Using the Roman Space Telescope to Reveal Black Hole Environments*

**Time:** 2:00-2:50 PM, Monday, Apr 20, 2026

**Location:** ECE 101

#### **Speaker:**

**Michael Fausnaugh**

Department of Physics and Astronomy, TTU

#### **Abstract:**

NASA's next flagship observatory is the Roman Space Telescope, scheduled to launch in September of 2026. Roman was designed to survey large areas of the sky with image quality as good as the Hubble Space Telescope, in order to address foundational questions about the nature of dark matter and dark energy. However, the sky surveys that Roman will perform over its 5-year primary mission (2027--2032) will transform virtually every area of astrophysics. I will discuss plans that my group has for using Roman data to investigate the formation and growth of supermassive black holes. The key idea is to use light echoes, which originate in variable flows of gas orbiting the black hole, to map out the immediate surroundings and environment of the supermassive black holes. Echo reconstruction is an ill-posed inverse problem in signal processing, and I will discuss techniques we have developed to overcome the usual limitations of one-dimensional timing echoes. While typical experiments of this sort usually recover only the mean radius of the gas flow, Roman data will be of such a high quality that we will be able to recover higher moments and infer the geometry and distribution of gas near the black hole. Constraining the geometry of the gas flows is a crucial question in determining how supermassive black holes grow, and what connection they have to the wider environment of their host galaxies. Furthermore, the very large Roman survey will make this experiment possible for an unprecedented number of supermassive black holes, nearly three orders of magnitude larger than previous surveys. With this data set, we will therefore be able to pin down the distribution of geometric parameters for the wider sample of supermassive black holes and constrain the physics of black hole growth.

#### **Speaker Bio:**

Dr. Michael Fausnaugh earned his PhD in Astronomy at the Ohio State University 2017, and then worked as a Research Scientist at MIT from 2017 to 2023. While at MIT, he supported NASA's Transiting Exoplanet Survey Satellite (TESS) mission as chair of the TESS Data Analysis Working Group. He joined the faculty at Texas Tech in the Department of Physics and Astronomy in 2023. In 2024, he served on the Roman Space Telescope Core Community Survey Definition team, and he currently serves as co-Chair of the Roman Space Telescope Science Collaboration Galaxies and Quasars group. He has expertise in time domain, extragalactic astronomy, with a special emphasis on supernovae, gamma-ray bursts, active galactic nuclei, and supermassive black holes.



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