Uncovering the First Billion Years of the Universe

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How the first stars and galaxies formed is an exciting open question in astrophysics and cosmology. Answering this question will shed light on the earliest stages of galaxy evolution and test models of dark matter particle physics. In this talk, I shall discuss how instruments such as the James Webb Space Telescope, 30 meter-class ground based telescopes, and large radio telescopes will soon obtain new data on stars and galaxies from the first billion years after the Big Bang. I will review cosmological structure formation and describe our group's work to model the large-scale abundance and distribution of the first stars. I will then describe how Lyman-alpha line emission can be used to survey the early Universe using a technique known as intensity mapping and present state-of-the-art theoretical predictions for these observations.

Tuesday, October 26 11 a.m. Taylor 111