Constraints on Axion Dark Matter

Low-mass star-forming galaxies that formed early in the universe are expected to be a primary driver of reionization and their numbers at high redshift are therefore of great interest. Within the standard CDM paradigm, there are several outstanding small-scale conflicts between the dark matter halos expected to host low-mass galaxies and observations of dwarf galaxies in the Local Group. If the dark matter were instead composed of axions, then structure formation in the Universe would be suppressed below the axion Jeans scale possibly resolving the small-scale tensions found in CDM. However, this would impact the population of high-redshift dwarf galaxies. Dr. Bozek will present constraints on the range of axion mass and axion fraction of dark matter using the high-z Hubble ultra-deep field UV-luminosity function and optical depth to reionization measured from CMB polarization. He will also discuss the ability of future experiments to probe axion parameter space further.