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ILLUMINATING THE YOUNG UNIVERSE THROUGH MM-WAVE OBSERVATIONS AND BEYOND

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Modern observatories have given us a wealth of knowledge about the early Universe, and the Universe as it exists today. Observations at mm wavelengths have shown us that the early Universe was unstructured and uniform. On the other hand, we can clearly see a rich variety of structures today (e.g. stars, planets, galaxies and galaxy clusters). However, very few direct observations of the intervening time exist. In this talk, I will give an overview of the history of the Universe, and describe how SPT-3G (a mm-wave camera on the South Pole Telescope) contributes to that knowledge. I will highlight my ongoing work that uses indirect observations to shed light on the "middle ages" of the Universe, when young stars and galaxies were beginning to light up the Universe. I will close with a discussion of near-future observatories that promise to directly observe such a fascinating age, with the ultimate goal of constraining early emergent Dark Matter, probing inflation through primordial non-gaussianity, and understand the formation of the first galaxies.