



## **The Racah Memorial Lecture 2013**

Monday, June 10 at 12:00 in the Levin 8 Lecture Hall

### **Cosmic Microwave Background: What Can We Learn about Physics from the Universe's Baby Picture?**

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#### **Abstract:**

The Planck Surveyor has just reported its first high resolution maps of the cosmic microwave sky. These measurements probe both the physics of the very early universe and the basic properties of the universe today. They are an important complement to the early space-based WMAP measurements and ground-based high resolution measurements from the Atacama Cosmology Telescope and the South Pole Telescope. The combination of these measurements rigorously tests our standard cosmological model and provides an accurate determination of basic cosmological parameters (the curvature of the universe, its matter density and composition). When combined with other astronomical measurements, the measurements constrain the properties of the dark energy and the mass of the neutrino. The observations also directly probe the physics of inflation and give us a powerful window into the physics of the early universe. Many key cosmological questions remain unanswered: What happened during the first moments of the big bang? What is the dark energy? What were the properties of the first stars? I will discuss the role of on-going and future CMB observations in addressing these key cosmological questions and describe how the combination of large-scale structure, supernova and CMB data can be used to address these questions.