

COLLOQUIUM

Einstein's Vision and the Quantum Universe

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Einstein's theory of gravity -- general relativity --- is important on two major frontiers in physics: The frontier of the very large --- the domain of astrophysics and cosmology. The frontier of the very small --- quantum mechanics and elementary particle physics. Large and small are one at the big bang. We will review some successes of classical general relativity on large scales. We will then turn to the quantum theory of the origin of our universe --- quantum cosmology. This requires both a quantum theory of gravity and a theory of the quantum state of the universe. We will describe the predictions of a simple quantum state of the universe for the large scale homogeneity, the spectrum of fluctuations that became the galaxies, and the cosmological constant. Today Einstein's vision and Einstein's theory are more central to physics than they were when they were formulated a century ago.