Bernard Schutz
Albert Einstein Institute

Gravity talks: observing the Universe with gravitational waves

Authors: B. Schutz

Einstein's work on gravity was inspired by the need to limit the speed of transmission of gravitational influences to the speed of light, for consistency with special relativity. This leads inevitably to gravitational waves. But the weakness of the waves' interaction with matter has made them hard to detect, so that the first detections are expected in the next few years. By the end of this decade there might be a network of 5 powerful detectors around the world, and a space-based detector might be under construction. When gravity begins to talk back to us, to tell us about strong fields directly through the waves they produce, astronomy will gain a completely new way of gathering information. We will test gravity theory in strong fields, verify directly the existing of horizons, finally learn how often black holes are produced when stars die, study the structure of neutron stars, directly probe the black-hole engines of gamma-ray bursts, and independently measure the rate of expansion of the universe.