The Search for Gravitational Waves

In 1916, Einstein predicted the existence of gravitational radiation, a fundamental consequence of his general theory of relativity. By the end of this decade, we expect to make the first direct observations of gravitational waves, using ground-based instruments (LIGO in the USA, VIRGO in Italy, GEO in Germany, KAGRA in Japan, LIGO in India). I describe the status and capabilities of the detectors, and outline the different types of astrophysical sources which we hope to detect. We expect that the first direct detections of gravitational waves (perhaps as early as 2017) will be from the coalescence and merger of binary neutron star pairs. Such events may also be accompanied by electromagnetic gamma-ray bursts. I will also outline our hopes for the longer-term future of the field, both for ground- and space-based detectors.