

NEXT CHALLENGES IN GRAVITATIONAL WAVE ASTRONOMY

David Blair

Gravitational wave physicists have now detected gravitational waves from ten coalescing black holes and an inspiralling neutron star binary. These are the tip of the iceberg. Within the Hubble volume black holes are coalescing roughly once every five minutes, while neutron stars coalesce four times per minute. The signals detected so far are dominated by the inspiral phase in the frequency band 30-300Hz. The rich physics of neutron star merger, and of the collapse of nuclear matter to form black holes, occurs in the frequency band 1-4kHz. New interferometers have been proposed capable of observing these events. They will require the use of very high optical power interferometers combined with optical squeezing, and are limited entirely by quantum noise. Ideas for such a detector in Australia will be presented. The new detectors would be the first able to probe the interior structure of neutron stars, the gravitational collapse of matter and the formation of an event horizon.