
Public Lectures
Conférences publiques
(Org: **Vojkan Jaksic** (McGill University) and/et **Val Kelly** (CMS))

ELLIOTT LIEB, Princeton University
Facets of Entropy

I will discuss and compare several ways in which the word entropy is used and the confusion that is sometimes generated. For example, to what extent is entropy well-defined outside of equilibrium and what does it mean for systems that have no thermodynamic limit? Does statistical mechanics define the concept and does it have an independent meaning outside of the self-referential concepts temperature and heat? A simple definition of entropy for macroscopic systems by Jakob Yngvason and myself that makes no mention of heat, temperature, and Carnot cycles will be described briefly.

RAINER WEISS, MIT, on behalf of the LIGO Scientific Collaboration
Exploration of the Universe with Gravitational Waves

The observations of gravitational waves from the merger of binary black holes and from a binary neutron star coalescence followed by a set of astronomical measurements is an example of investigating the universe by "multi-messenger" astronomy. Gravitational waves will allow us to observe phenomena we already know in new ways as well as to test general relativity in the limit of strong gravitational interactions – the dynamics of massive bodies traveling at relativistic speeds in a highly curved space-time. Since the gravitational waves are due to accelerating masses while electromagnetic waves are caused by accelerating charges, it is reasonable to expect new classes of sources to be detected by gravitational waves as well. The lecture will start with some basic concepts of gravitational waves, then briefly describe the instruments and the methods for data analysis that enable the measurement of gravitational wave strains of the order of 10^{-21} and will then present the results of recent runs. The lecture will end with a vision for the future of gravitational wave astrophysics and astronomy.