ID de Contribution: **189** Type: **Ordinary**

Results from the first science run of advanced GW detectors

vendredi 18 mars 2016 17:40 (20 minutes)

On September 14, 2015 at 09:50:45 UTC the two LIGO detectors simultaneously observed a transient gravitational-wave signal. The signal matches the waveform predicted by general relativity for the inspiral and merger of a pair of black holes and the ringdown of the resulting single black hole. It was observed with a matched-filter signal-to-noise ratio of 24 and a false alarm rate estimated to be less than 1 event per 203000 years, equivalent to a significance greater than 5.1 sigma. The source lies at a luminosity distance of 410 Mpc corresponding to a redshift z=0.09. In the source frame, the initial black hole masses are 36 Msol and 29 Msol, and the final black hole mass is 62 Msol, with 3.0 Msol c^2 radiated in gravitational waves.
These observations demonstrate the existence of binary stellar-mass black hole systems. This is the first direct detection of gravitational waves and the first observation of a binary black hole merger.

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Classification de Session: DM & Cosmology

Classification de thématique: Experiment