

# WAVELETS ON THE HUNT FOR GRAVITATIONAL WAVES

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On September 14th 2015, LIGO (Laser Interferometer Gravitational-Wave Observatory) in USA, performed the first detection of a gravitational wave generated by the coalescence of two black holes. The signal processing algorithm which allowed this detection uses in a crucial way a variant of wavelet bases called "Wilson bases" (it is an orthonormal "time-frequency" decomposition, as opposed to standard wavelets which are of "time-scale" type). We will mention the origin of such bases, which starts with the seminal work of Gabor in the 50s, and was made more precise by K. Wilson at the beginning of the 80s (motivated by renormalization theory). We will then show why such bases are particularly well adapted to such gravitational waves, and which technical choices were made in the detection algorithm. Finally, we will mention the perspectives opened by this new type of astronomy which, for the first time, is not based on light or electromagnetic waves detection, and the role that such bases, or variants are expected to play in it.