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ABSTRACT

The gravitational wave detectors at the LIGO Observatories have achieved record sensitivity to gravitational-waves produced by astrophysical systems. The LIGO Scientific Collaboration has analyzed data taken in several science runs, searching for different signals. We describe a search for black holes with less than a solar mass in the LIGO data taken from February 22 to March 24, 2005. No gravitational waves were found, and an upper limit was set on the rate of mergers of such binary systems. This search, as well as other searches for binary systems, are affected by non-stationary noise. We describe the sophisticated pipeline that attempted to reduce the false trigger rate while maximizing the sensitivity to simulated signals. Details regarding this search and interpretation of this search are presented along with new strategies to increase the confidence in detection through signal based vetoes and better template waveforms.