

Gravitational Wave Detection with Pulsar Timing Arrays: Prospects and Status

Wednesday, 11 September 2013 14:00 (20 minutes)

Pulsars rotating at periods of a few milliseconds have proven to act as precise celestial clocks. Pulsar Timing Arrays (PTAs), use multiple pulsars distributed throughout the sky to detect disturbances in the pulsar-local space-time, and correlated disturbances in Earth's perceived location. PTAs are uniquely sensitive to the low-frequency (nHz-uHz) gravitational wave spectrum, and are capable of detecting gravitational waves (GWs) from cosmic string loops and binary supermassive black hole binaries formed in galaxy mergers. Excitingly, the sensitivity of pulsar timing has reached the upper range of the GW signal predictions for standard cosmological structure formation scenarios. This talk will describe PTAs, their current status, sensitivity to various source type, and our expected prospects for the future detection of gravitational radiation using PTAs. Part of this research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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Session Classification: Gravitational Waves I: Detectors

Track Classification: Gravitational Waves