XV Black Holes Workshop



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J. Pasiecznik: Prospects for gravitational wave detection with CubeSats

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We explore the feasibility of using CubeSats for detecting Gravitational Waves (GW). Heavier black hole mergers are dominated by low-frequency emission, however terrestrial gravitational noise contributions prevent the use of ground based low-frequency GW detectors. We present the sources of such noise contributions and the argument for the use of space based low-frequency GW detectors. We analyze the detrimental effect of forces on CubeSats that are in Earth orbit, including that of solar radiation pressure and J2 perturbations. We estimate the ability of measuring the acceleration of test masses (TMs) that are in free fall using CubeSats. By investigating the mass cost reduction of CubeSats, we present benefits of using CubeSats over ground-based detectors and current LISA systems. We discuss constraints associated with miniaturizing the GW detection systems used for LISA. Our investigations lead us to developing a comprehensive argument for using CubeSats for detecting GWs with an analysis of the signal to noise ratio for low-frequency gravitational wave detection.

Session Classification: Session 3 A