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How well can LISA measure black hole binaries when the spins are aligned by gas accretion? RYAN LANG, NASA Goddard Space Flight Center, SCOTT HUGHES, Massachusetts Institute of Technology, NEIL CORNISH, Montana State University — Massive black hole binaries are one of the primary sources for the Laser Interferometer Space Antenna (LISA). The gravitational waves (GWs) measured by LISA will contain information about many properties of the binary, including masses, spins, sky location, and distance. We present results for how well LISA can measure these parameters. Spin precession effects are known to break degeneracies and consequently reduce parameter errors. However, gaseous torques may partially align the spins of a binary with its orbital angular momentum, suppressing the precession and severely degrading measurement. We show that including higher harmonics beyond the quadrupole can make up for this degradation. Like precession, higher harmonics break degeneracies and reduce errors; unlike precession, they are always present in the waveform, regardless of spin angle. When harmonics are included, parameters of partially aligned binaries are often measured as well or better than parameters of binaries with random spins but no harmonics.

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