Abstract Submitted
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NR Simulations of PPI-Unstable BH-Disk Systems: BH Spin, Magnetic Fields, and Gravitational Wave Detectability[1] ERIK WESSEL, VASILEIOS PASCHALIDIS, University of Arizona, ANTONIOS TSOKAROS, MILTON RUIZ, STUART SHAPIRO, University of Illinois — Accretion disks around BHs are an under-studied potential GW source. The hydrodynamic Papaloizou-Pringle Instability (PPI) can cause persistent orbiting matter clumps to grow and produce copious GWs. Via full numerical relativity simulations of self-gravitating disks, we have extended the understanding of these BH-disk systems in two new ways. First, we conducted the first-ever study of the PPI around spinning BHs ($a/M = 0.7$). We found that, in addition to slightly shifting orbital frequencies, prograde spin can reduce the accretion rate and extend GW signal lifetimes. Systems of $10M_\odot$ - relevant for BHNS mergers - could be detectable by Cosmic Explorer out to $\sim$ 300 Mpc, while DECIGO (LISA) could detect systems of $1000M_\odot$ ($10^5 M_\odot$) - relevant for disks forming in collapsing supermassive stars - out to cosmological redshift of $z \sim 5$ ($z \sim 1$). Second, we investigated the impact of magnetic fields on the PPI.

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