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Small Seed Black Hole Growth in Various Accretion Regimes HANNALORE J. GERLING-DUNSMORE, PHILIP F. HOPKINS, Caltech — Observational evidence indicates a population of super massive black holes (SMBHs) $(\sim 10^9 - 10^{10} M_{\odot})$ formed within 1 Gyr after the Big Bang. One proposed means of SMBH formation is accretion onto small seed black holes (BHs) (~ $100M_{\odot}$). However, the existence of SMBHs within 1 Gyr requires rapid growth, but conventional models of accretion fail to grow the seed BHs quickly enough. Super Eddington accretion $(M > M_{Eddington})$ may aid in improving growth efficiency. We study small seed BH growth via accretion in 3D, using the magneto-hydrodynamics+gravity code GIZMO. In particular, we consider a BH in a high density turbulent starforming cloud, and ask whether or not the BH can capture sufficient gas to grow rapidly. We consider both Eddington-limited and super Eddington regimes, and resolve physics on scales from 0.1 pc to 1 kpc while including detailed models for stellar feedback physics, including stellar winds, supernovae, radiation pressure, and photo-ionization. We present results on the viability of different small seed BHs growing into SMBH candidates.

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