Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Magnetorotatioal Collapse of Supermassive Stars: Black Hole Formation and Jets LUNAN SUN, University of Illinois at Urbana-Champaign, VASILEIOS PASCHALIDIS, Princeton University, MILTON RUIZ, STUART SHAPIRO, University of Illinois at Urbana-Champaign — We perform magnetohydrodynamic simulations in full general relativity of the collapse of radially unstable, uniformly rotating, massive stars to black holes. The stars spin at the mass-shedding limit, account for magnetic fields and obey a $\Gamma = 4/3$ EOS. The calculations lift the restriction of axisymmetry imposed in previous simulations. Our simulations model the direct collapse of supermassive stars to supermassive BHs ($\geq 10^4 M_\odot$) at high cosmological redshifts, which may explain the appearance of supermassive BHs and quasars by z $\sim$ 7. They also crudely model the collapse of massive Pop III stars to massive BHs, which could power some of the long gamma-ray bursts observed by FERMI and SWIFT at z $\sim$ 6-8. We analyze the properties of the electromagnetic and gravitational wave signatures of these events and discuss the detectability of such multimessenger sources.

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Date submitted: 30 Sep 2016 Electronic form version 1.4