Abstract Submitted
for the APR14 Meeting of
The American Physical Society

**Measuring the Angular Momentum Distribution of Core-Collapse Supernova Progenitors** SARAH GOSSAN, ERNAZAR ABDIKAMALOV, ALEXANDRA DEMAIO[1], CHRISTIAN OTT, Cal Inst of Tech (Caltech) — The gravitational wave signature of core-collapse supernovae encodes important information on the physical characteristics of the associated progenitor stars, particularly the angular momentum distribution, in addition to the relevant fundamental physics, for example, the nuclear equation of state and electron capture during collapse. Neither of these aspects can be inferred via observations of core-collapse supernovae in the electromagnetic spectrum. We explore the dependence of the gravitational wave signals on the total angular momentum and its distribution in the progenitor. To this end we carry out a large set of axisymmetric (2D) general relativistic hydrodynamics simulations of rotating core collapse. We construct a numerical template bank from these waveforms, and apply a matched filtering analysis to infer the total angular momentum and its distribution in the progenitor's inner core, given an observed, previously unknown gravitational wave signal. In the context of Advanced LIGO, we show that the total angular momentum can be inferred to within $\sim 20-30\%$, for galactic supernovae with rapidly rotating cores at a fiducial distance of 10 kpc.

[1]Also affiliated with Rutgers.

Sarah Gossan
Cal Inst of Tech (Caltech)

Date submitted: 17 Dec 2013 Electronic form version 1.4