## W54a Ultra-Long Gamma-Ray Bursts and Tidal Disruption Events from Intermediate-Mass Black Holes in Collapsing Star Clusters

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Successive mergers and collisions of massive stars at the center of a collapsing cluster lead to form $\sim 1000\ M_\odot$ supermassive star (SMS) within a few Myr, which collapses into an intermediate mass black hole (IMBH). With the help of N-body simulations, we study the formation and early growth of IMBH, in particular those formed in a high-redshift metal-poor cluster. We show that the angular momentum of the SMS can be large so that the Kerr parameter of the IMBH becomes $a \sim 1$. Such a high-spin IMBH formation may accompany an ultra-long gamma-ray burst (GRB). We also show that several massive stars with $M_* =$ a few $10 - 100\ M_\odot$ can be sent to the IMBH and tidally disrupted before they explode as supernovae. Those tidal disruption event (TDE) results in forming a hyper accreting disk with a peak accretion rate of $\sim 10^{-3} M_\odot\ s^{-1}$ lasting for $\sim 10^4$ s. If relativistic jets emerge successfully in such ultra-long GRBs and TDEs, the prompt and afterglow emission can be detectable even up to $z = 20$ by e.g., Swift BAT and VLA, respectively, which can be used as a unique probe of massive-star clusters and super-massive-black-hole seeds at high redshifts.