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Variety of disk wind-driven explosions in massive rotating stars

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At the end of its evolution, the collapse of a massive star's core into a proto-neutron star is the starting point for a complex sequence of events with many possible outcomes.
Specifically, very compact and rotating stars with a high mass ($M_* > 16\, M_\odot$), are likely to create a so-called "failed core-collapse supernova", forming a black hole surrounded by an accreting disk. It has been shown that the disk wind generated through viscous dissipation inside the disk may be the source of high energy ($E_{\rm expl} > 10^{52}$ erg) supernovae with a high ^{56}Ni mass ($M_{^{56}Ni} \geq 0.1\, M_\odot$).

In this scenario, the properties of the ejecta and the ^{56}Ni production are strongly related to the wind injection from the accretion disk. In this talk, I will analyze these properties, investigating the impact of the disk mass and energy injected from the system on the final ejecta. I will focus on observational properties such as the explosion energy, the ejecta mass, and the ^{56}Ni mass produced for different progenitor model. I will then show the strong correlation between the explosion energy and the ejecta mass, and compare our results for the ^{56}Ni mass distribution with observational data.

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