

# Writing Assignment 1: Astrobites

Beacons in the Dark Universe: Using Novae and  
Supernovae to Detect Dwarf Galaxies in the  
Local Universe

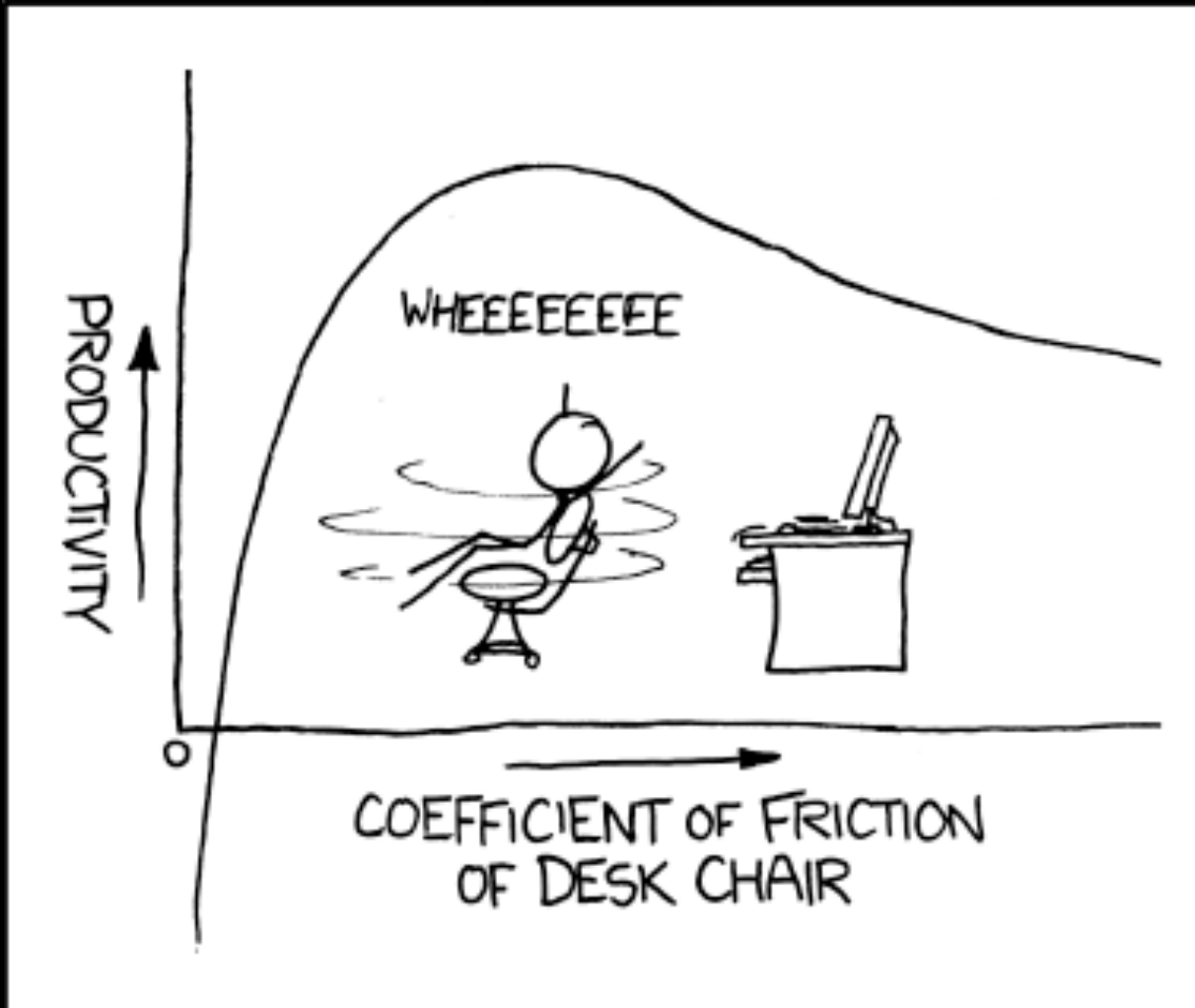
# How to Read a Scientific Paper

## ABSTRACT

We propose that luminous transients, including novae and supernovae, can be used to detect the faintest galaxies in the universe. Beyond a few Mpc, dwarf galaxies with stellar masses  $\lesssim 10^6 M_\odot$  will likely be too faint and/or too low in surface brightness to be directly detected in upcoming large area ground-based photometric surveys. However, single epoch LSST photometry will be able to detect novae to distances of  $\sim 30$  Mpc and SNe to Gpc-scale distances. Depending on the form of the stellar mass-halo mass relation and the underlying star formation histories of low mass dwarfs, the expected nova rates will be a few to  $\sim 100 \text{ yr}^{-1}$  and the expected SN rates (including both type Ia and core-collapse) will be  $\sim 10^2 - 10^4$  within the observable ( $4\pi \text{ sr}$ ) volume. The transient rate associated with intrahalo stars will be comparably large, but these transients will be located close to bright galaxies, in contrast to the dwarfs, which should trace the underlying large scale structure of the cosmic web. Aggressive follow-up of hostless transients has the potential to uncover the predicted enormous population of low mass field dwarf galaxies.

*Subject headings:* galaxies: stellar content — galaxies: dwarf — supernovae: general — novae, cataclysmic variables

# How to "Read" a Scientific Paper



# Paper Structure (Roughly)

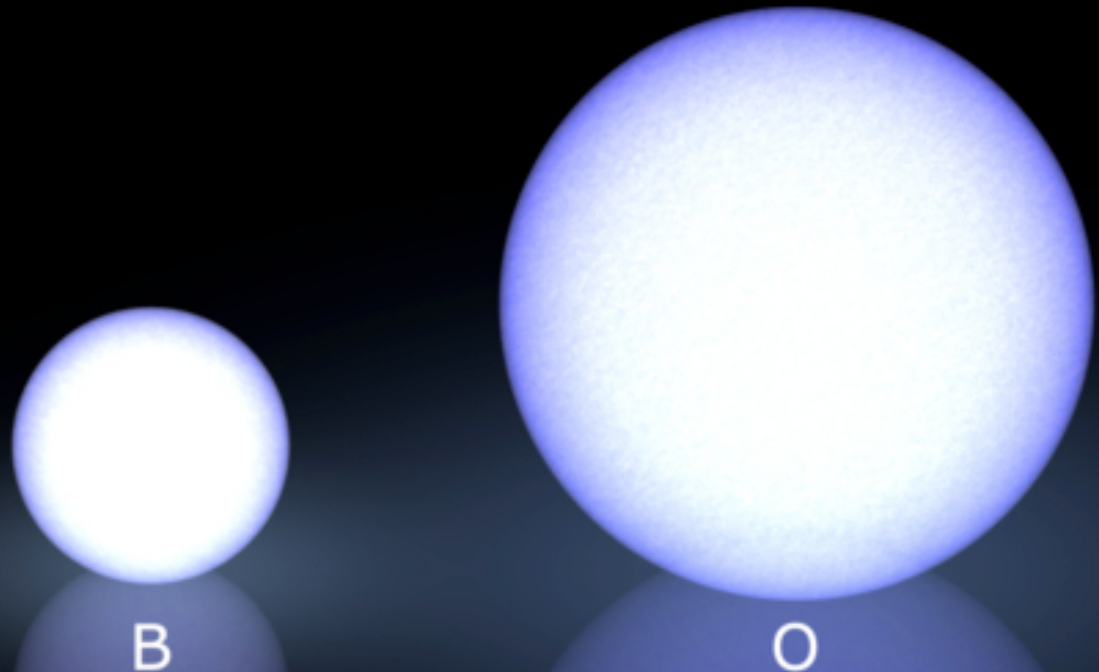
- Abstract : summary of paper, aka “is this even worth reading?”
- Introduction: puts topic in context, aka “the big picture,” or “why care?”
- Methods: technical details, aka “the how”
- Results: findings of the paper, aka “the discoveries”
- Discussion: interpretation of findings, aka “the implications”
- Conclusions: summary including implications

# Intro to Stellar Evolution

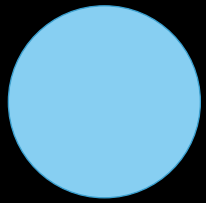
"low mass"

"high mass"

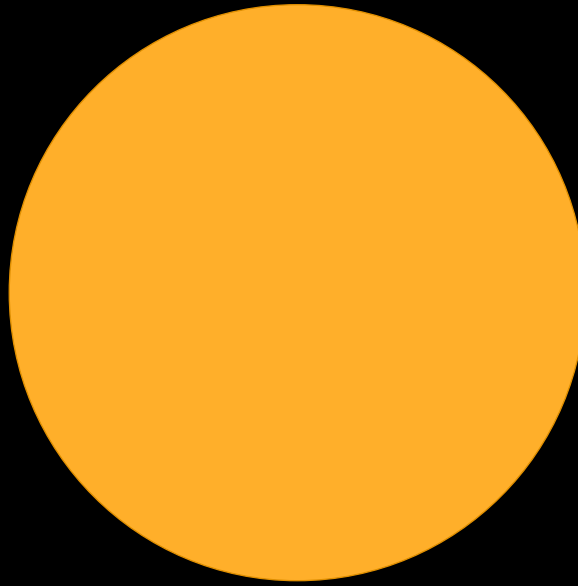
Sun



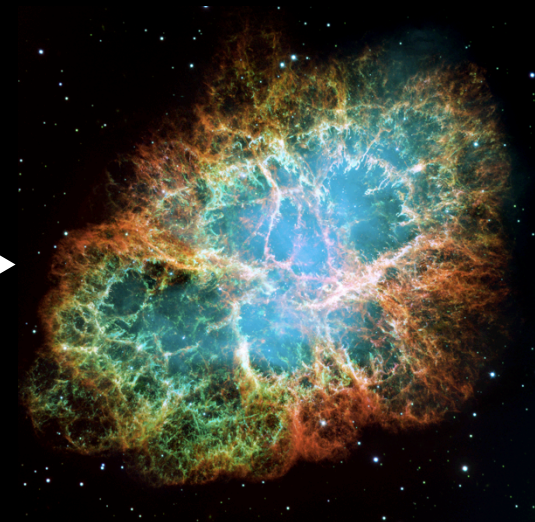
# High Mass Stars



*high mass  
star*

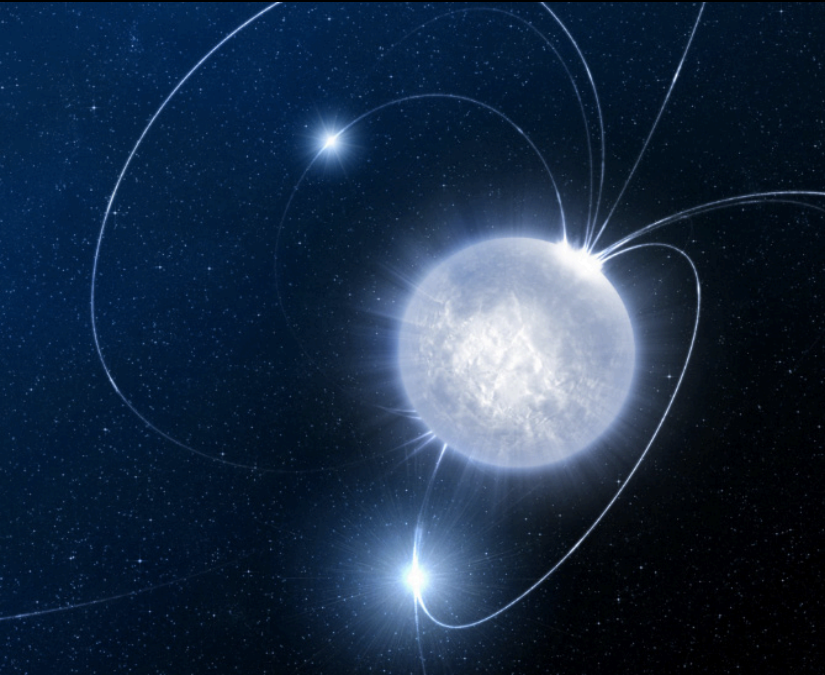


*red or blue supergiant*



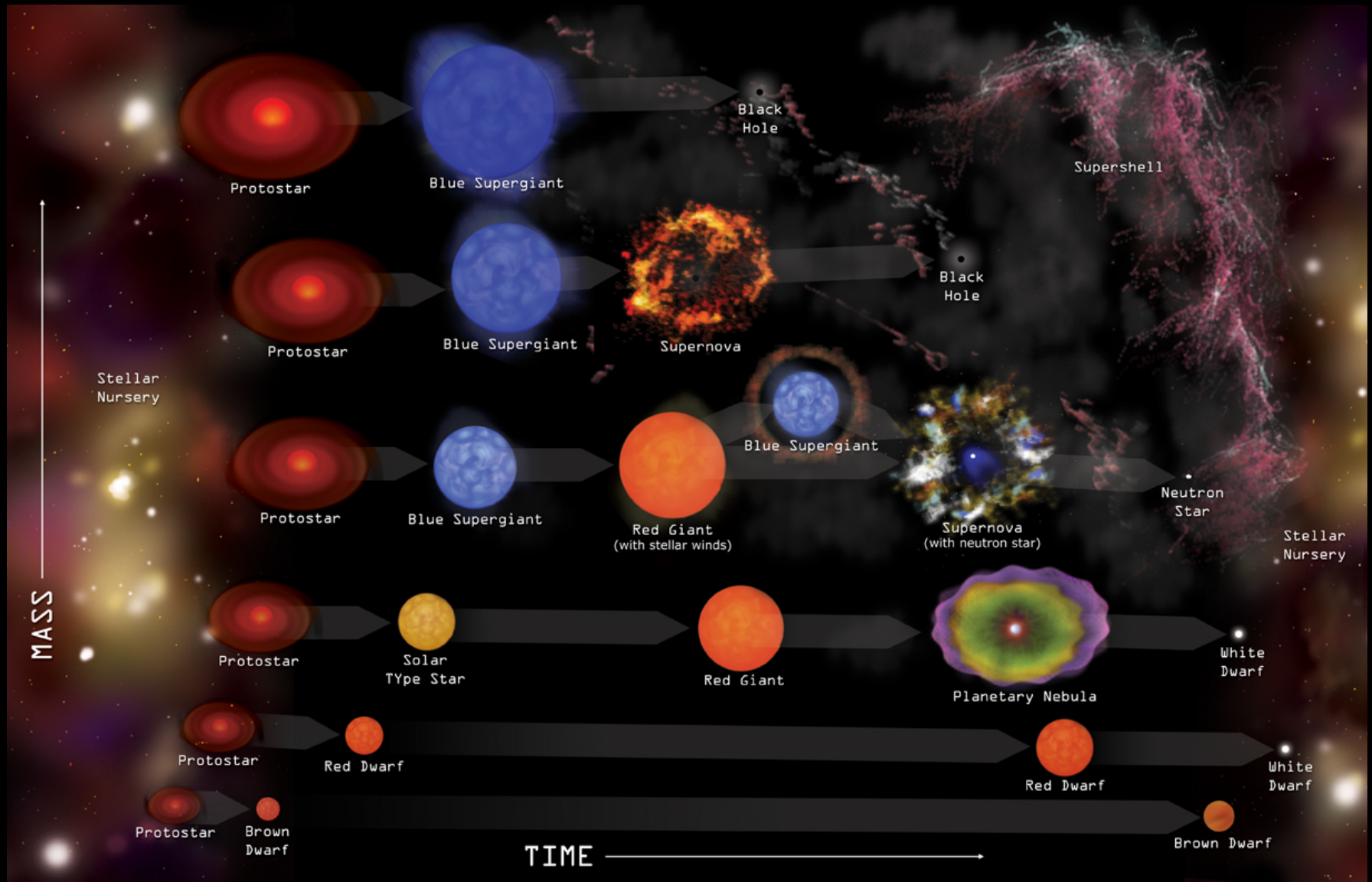
*supernova explosion*

# Compact Objects





# Stellar Evolution (Roughly)





# Binary Stars



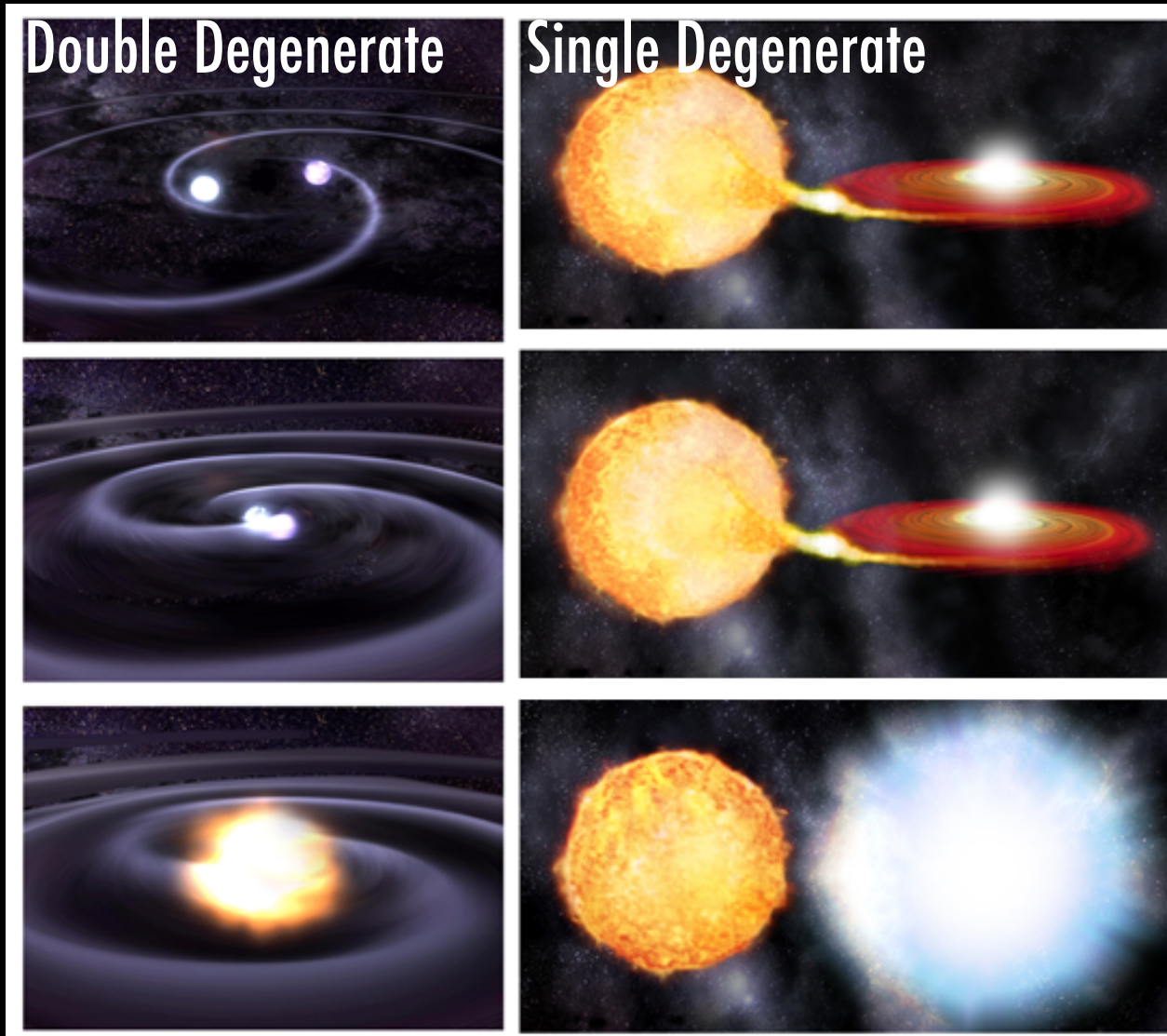
Current FPS: 392.43

Average FPS: 392.811  
Worst FPS: 325.674 (51 ms)  
Best FPS: 403.194 (1 ms)  
Triangle Count: 476

# Stellar Evolution w/ Binaries

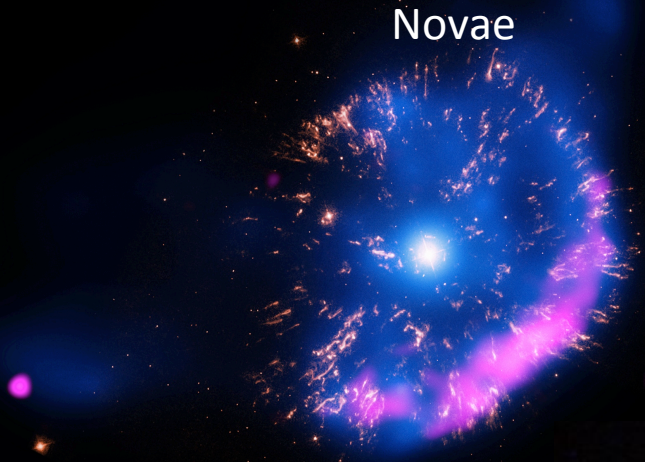


# For Our Purposes...



# (Super)Novae Flavors

Novae



Type II



Type Ia

