Searching for hidden black holes lurking in our Galaxy

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Description:
Black holes are among the most elusive objects in our universe. Theoretical simulations predict millions to hundreds of millions of black holes roaming through our Galaxy. However, there are only ~100 found so far. It is not currently clear whether this stark gap is due to observational challenges in finding black holes or whether our incomplete understanding of black hole formation and evolution is also to blame. On the heels of recent breakthroughs in discoveries of black holes, including emerging population of merging black holes, and backed by data from novel ongoing astronomical surveys, in this project we aim to:

- Perform theoretical simulations of black hole population in the Galaxy based on multiple sets of assumptions based on recent advancements in black hole research.
- Compare the results to nascent observed samples of black holes.
- Identify theoretical and observational factors contributing to the gap between theoretical simulations and observed samples of black holes.

Black hole astrophysics is an exciting and rapidly evolving field of astronomy and as more observations reveal previously unknown black holes, they open the path to a more accurate understanding of the physics behind their formation and evolution through theoretical modeling. In this project we will focus on linking observations and theoretical models to characterize the population of black holes in our Galaxy.

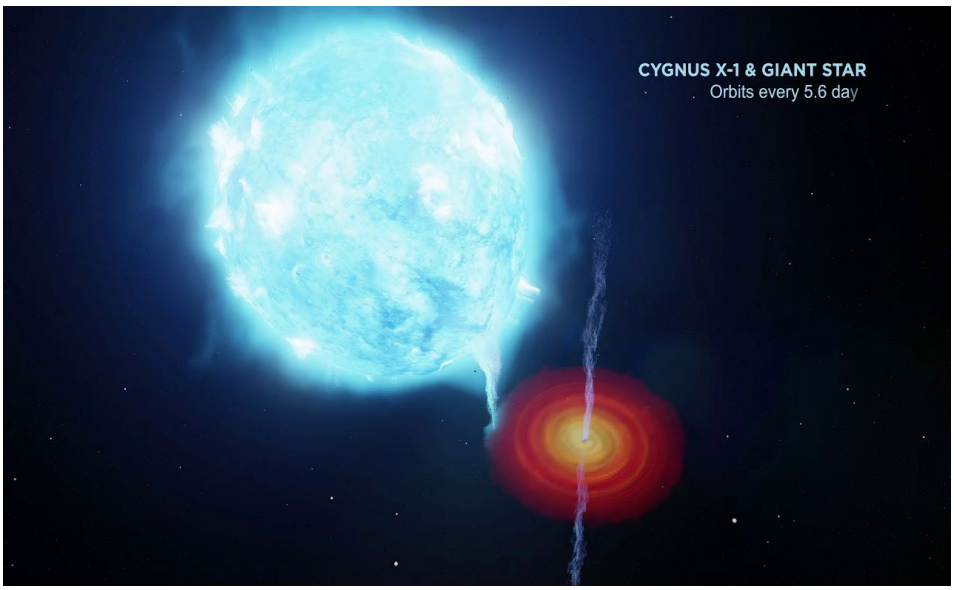

Figure: Cygnus X-1 is the heaviest stellar mass black hole identified in our Galaxy, accreting from a companion star. In this project, we aim to answer questions such as “why are black holes as heavy as Cygnus X-1 rare?”.