Cygnus X-1

Bailey Conrad with Dr. Alex Storrs
Cygnus X-1 & HDE 226868

- Black hole and blue supergiant variable star
- About 15 and 30 solar masses
- Six day period
Method

- Observe Cygnus X-1 using spectrograph
  - Deneb and Vega for comparison
- Compare variances in emission spectra
  - H-alpha (6563 Å)
  - He I (6678 Å)
  - He II (4686 Å & 4846 Å)
  - O[III] (5007 Å)
Cygnus X-1 & HDE 226868
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Schwarzschild Metrics
Quantum Entanglement
Firewall Thermodynamics
Information Paradox
The 1997 Information Paradox Bet

Stephen Hawking and Kip Thorne
Hawking Radiation (1974):
Information is lost forever when crossing the event horizon

John Preskill
Law of Conservation of Information:
Information cannot be created destroyed only transferred
The following three statements cannot all be true:

1. Hawking radiation is in a pure state
2. The information carried by the radiation is emitted from the region near the horizon, with low energy effective field theory valid beyond some microscopic distance from the horizon
3. The infalling observer encounters nothing unusual at the horizon
Information Paradox

Law of Conservation of Information:
Information cannot be created nor destroyed, only transformed