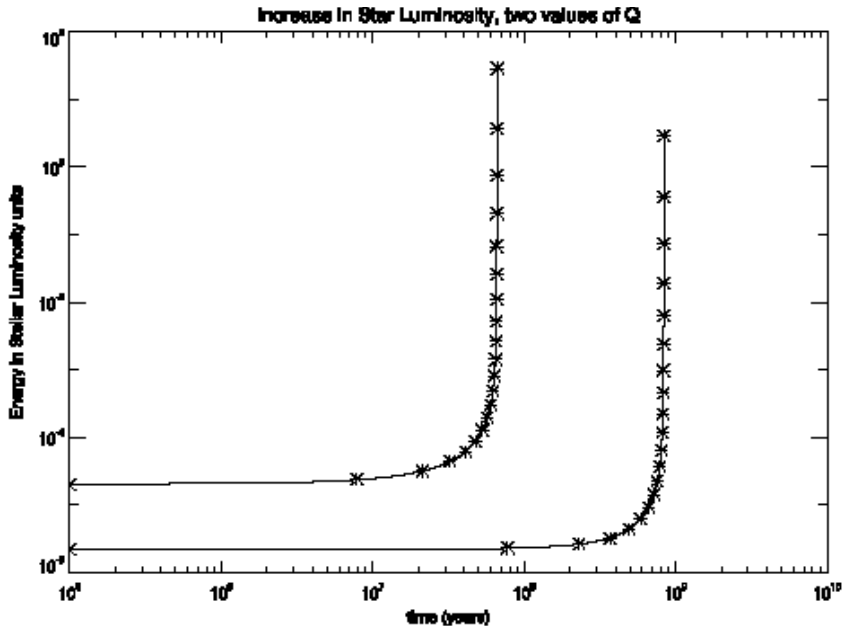
Observing Light Curves of Falling Planets and Brown Dwarfs

The final stage of supermassive planet and brown dwarf migration is characterized by huge energy input into the star that will dramatically increase its luminosity



Increase in stellar luminosity for XO-3, by log of years, for conservative tidal Q values of 6 and 7. Most planets will Roche Lobe Overflow (RFO) but in the XO-3 the planet may reach the star with the orbital energy of 50,000 years of the star's luminosity

Model and Search

How much time in "bright time" for the most massive or dense planets?

Fraction of time, per million, that will have 10% or 100% luminosity increase

System	Destruction (in 10^6 yrs) if Q_*~10^6	Increase L 10% if Q_*~10^6	Increase L 100% if Q_*~10^6	Destruction (in 10^6 yrs) if Q_*~10^7	Increase L 10% if Q_*~10^7	Increase L 100% if Q_*~10^7	Energy at RLO or contact ($L_{sun\text{-}years}$)
XO3	**66**	**582**	**77**	**834**	**58**	**5**	**53000**
wasp14	**58**	**552**	**59**	**584**	**59**	**0**	**51000**
wasp10	**1302**	**63**	**0**	**12700**	**0**	**0**	**230000**
HATP-2	**516**	**65**	**8**	**9070**	**4**	**0**	**42000**
Corot3	**144**	**293**	**39**	**1440**	**39**	**4**	**63000**

Will learn about:

- Planetary atmospheres being spread around star
- Improve understanding of tides, stellar interiors, and planetary interiors

Further work

- Modeling light curves
- Model complete energy release
- Gas fall from massive evaporation?
- More common before dissipation of nebulae? Affect nebula?
- Inspiral of known planets (Goodman)