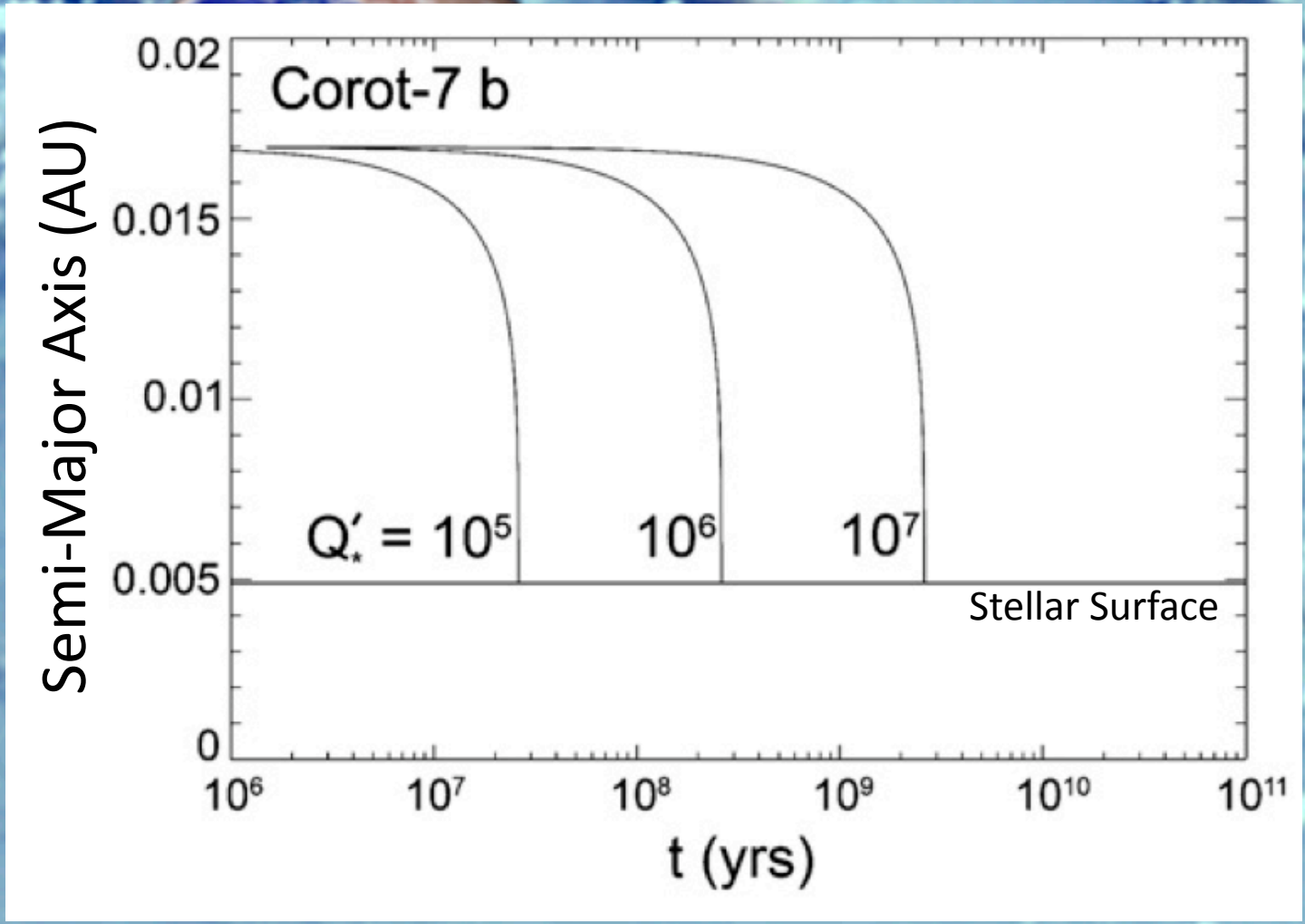
Tidal Destruction of Exoplanets



Q_*' = Stellar Response to tides

Jackson, Barnes & Greenberg (2009)

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But are such trajectories realistic?

=Q_*'

(Chandrasekhar 1969). The dissipation constant and the Love number of a star are poorly known. Values for $Q_\star/k_{2\star}$ vary in wide ranges in the literature. Values from 10^5 to $10^{5.5}$ (Lin et al. 1996; Jackson et al. 2008) would yield unrealistic small time scales of 70 Myr for the decay because it would be highly improbable to observe this planet today. For $Q_\star/k_{2\star} = 10^6$ to $10^{6.5}$, the orbit would decay within 2 Gyr. The orbit may be considered stable with respect to tidal forces for $Q_\star/k_{2\star} > 10^7$. The

Léger *et al.* (2009)

How many planets are in their death throes?

Is it an acceptable fraction?

The Plan

Calculate infall timescales for known transiting planets as a function of Q'

(Solve two coupled, non-linear, ordinary diff. eq.)

How does this time compare with their ages?

Q' values that predict many planets at the end of their life are not realistic

How does *Kepler* data fit in? (must assume mass-radius relationship)

Benefit to you: You will be able to analyze the tidal effects on transiting planets