Tidal disruption events induced by the Kozai-Lidov mechanism

Naoki Seto and Mao Iwasa
Kyoto University
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The Kozai-Lidov mechanism

Kozai mechanism works for hierarchical triple, and oscillations of inner eccentricity ($e_1$) and inclination.

Characterized by a simple Hamiltonian $H_0$

$$H_0(G_1, \omega_1)$$

$$G_1 \equiv \sqrt{1 - e_1^2}$$

$\omega_1$ Argument of pericenter
Evolution of KL by infalling tertiary

Stellar cluster potential

Star

Central MBH

Infalling tertiary MBH

\[ H_1(G_1, \omega_1; a_2) \]

External parameter (decreasing outer semimajor axis)
1. How the phase space structure (e.g. fixed points) depends on $a_2$?
2. Adiabatic invariant (area conservation)
Interesting results for inner eccentricities

• Nearly circular orbit $\rightarrow$ suddenly becomes highly eccentric (at separatrix crossing)

Inverted correspondence between initial and final eccentricities