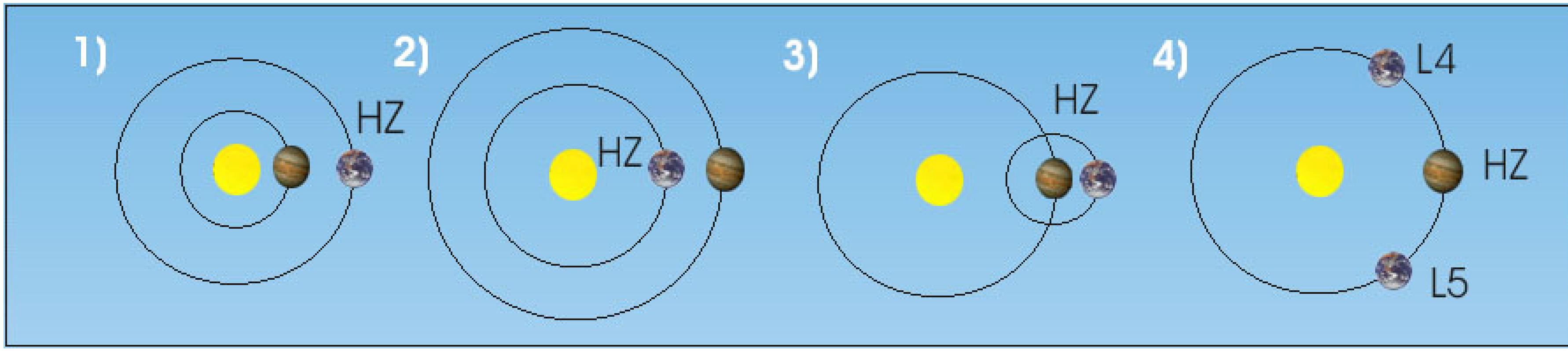
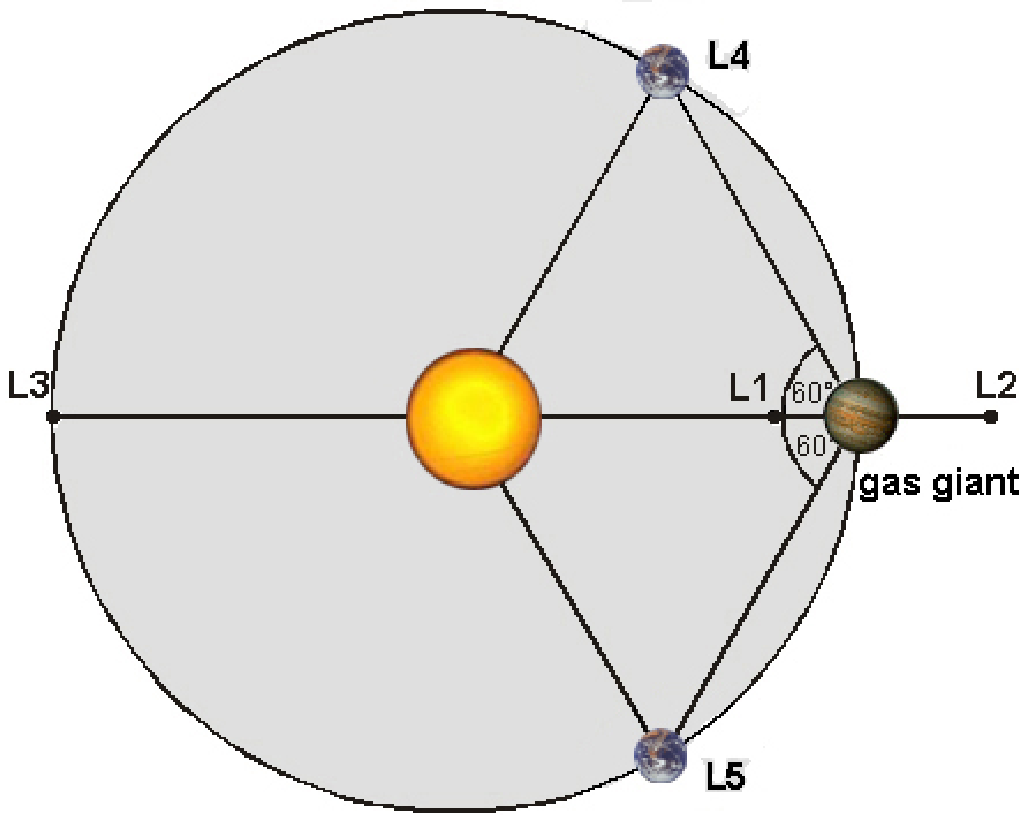


4) **Trojan configuration**:

…Like the Jupiter-Trojans

Two groups of asteroids close to L4 and L5

1. L_1, L_2 and L_3 (not stable) lie on a straight line connecting the primaries
2. L_4 and L_5 (stable for $\mu < 1{:}25$) are at the third vertex of an equilateral triangle (Sun-Jupiter-Asteroid)



Trojan formation & evolution

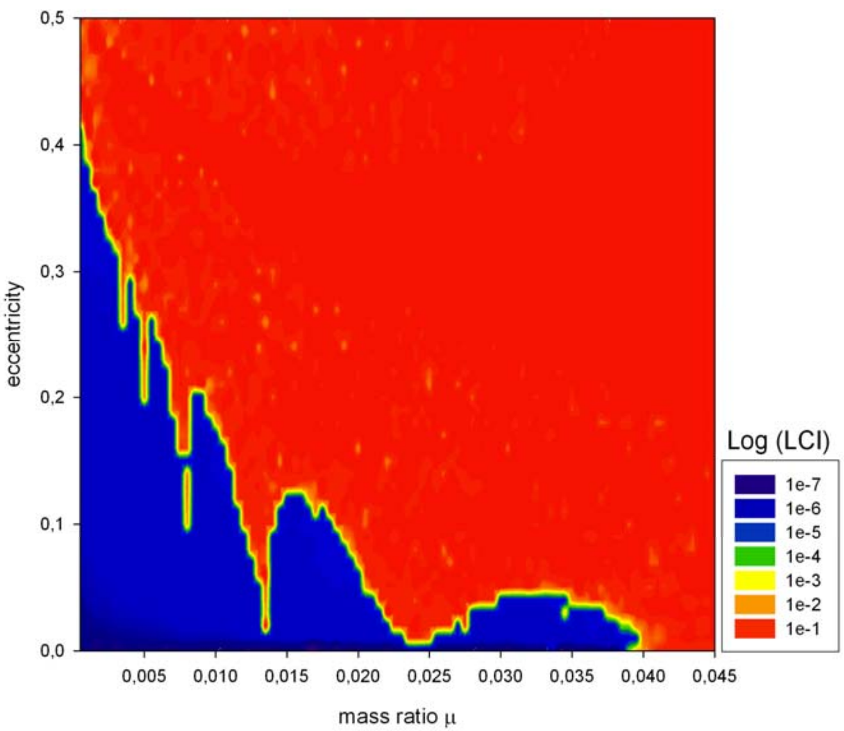
Theoretical studies predict that Trojans are likely a frequent by product of planet formation and evolution.

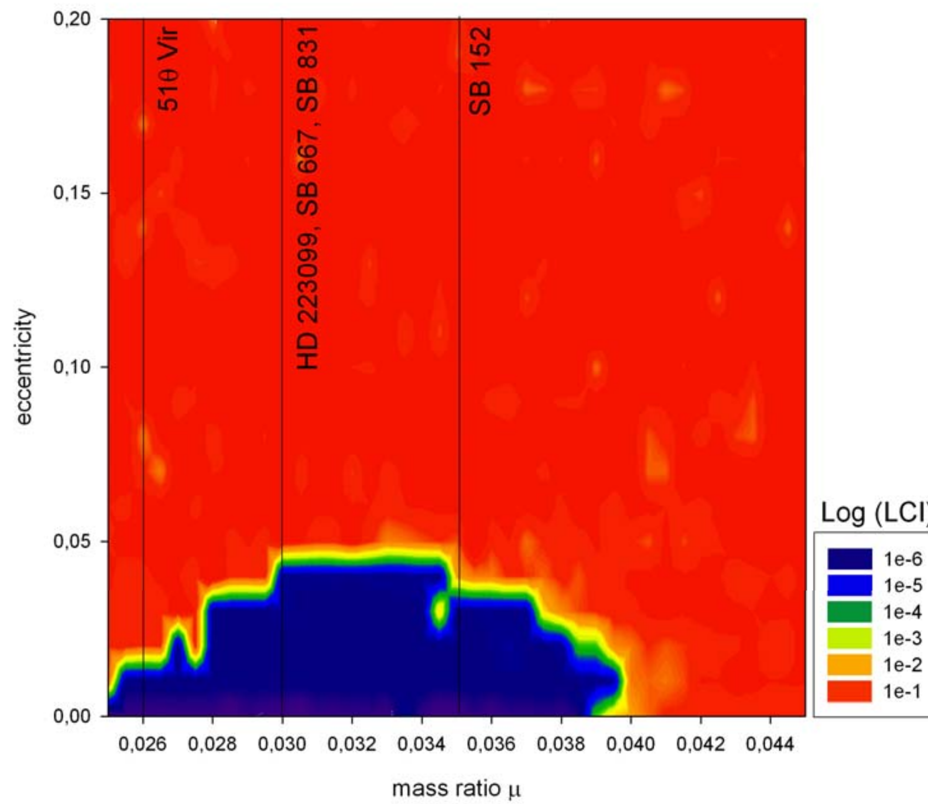
- Formation in L4/L5 (Beaugé et al. 2006, Chiang & Lithwick 2005) 0.6 M_{earth}
- Planet captured in L4/L5 after a violent event (Morbidelli et al. 2005)
- Convergent migration could trap multiple protoplanets into a 1:1 mean motion resonance (Thommes 2005, Cresswell & Nelson 2006)

  captured bodies large libration amplitude ->horseshoe orbits

  the interactions with the gaseous or planetesimal disk will damp the libration amplitude -> tadpole orbits

T-type planetary motion in real double star systems





T-type planetary motion in extra-solar systems with one giant planet in the HZ

Name	Spec.	mass $[M_{sol}]$	mass $[M_{jup}]$	a [AU]	ecc	HZ [AU]	partly in HZ [%]
HD101930	K1V	0.74	0.3	0.3	0.11	0.30-0.64	53
HD93083	**K3V**	**0.70**	**0.37**	**0.48**	**0.14**	**0.28-0.60**	**100**
HD134987	G5V	1.05	1.58	0.78	0.24	0.75-1.40	58
HD17051	**G0V**	**1.03**	**1.94**	**0.91**	**0.24**	**0.70-1.30**	**100**
HD28185	**G5**	**0.99**	**5.7**	**1.03**	**0.07**	**0.70-1.30**	**100**
HD33564	F6V	1.25	9.1	1.1	0.34	0.99-2.12	35
HD99109	**K0**	**0.93**	**0.50**	**1.11**	**0.09**	**0.65-1.25**	**100**
HD27442	**K2IVa**	**1.20**	**1.28**	**1.18**	**0.07**	**0.93-1.80**	**100**
HD188015	**G5IV**	**1.08**	**1.26**	**1.19**	**0.15**	**0.70-1.60**	**100**
HD114783	K0	0.92	0.99	1.20	0.10	0.65-1.25	50
HD20367	G0	1.05	1.07	1.25	0.23	0.75-1.40	76
HD23079	(F8)/G0V	1.10	2.61	1.65	0.10	0.85-1.60	35

Numerical work by R. Schwarz:

Catalogue for possible terrestrial planets in the 1:1 resonance with a Jupiter-like planet in extrasolar planetary systems.

Dynamical model:
Planar elliptic restricted 3 body problem (ER3BP)

Integration time up to 10^7 revolutions

Initial conditions:

Modelparameters

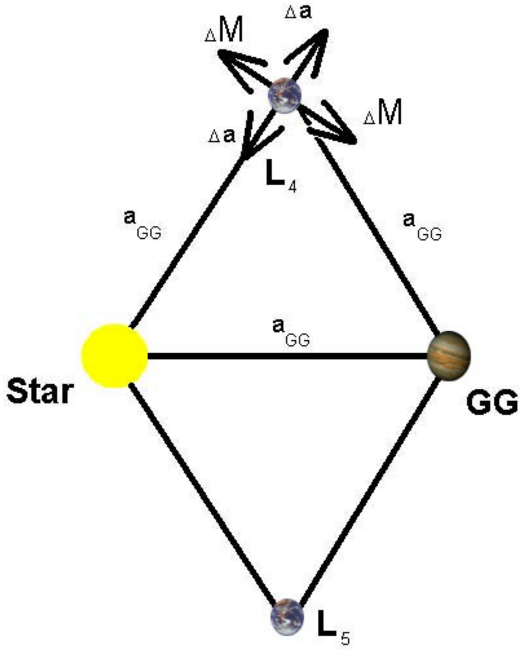
Eccentricity of the gas giant (GG) & the Trojan planet
$0{,}00 < e < 0{,}3$ $\Delta e=0{,}05$

Mass ratio (μ)
$0{,}001 < \mu < 0{,}04$ $\Delta \mu=0{,}001$

Stable region:

$0{,}9\ AU < a < 1{,}1\ AU$ $\Delta a=0{,}0025$
a is normalized to 1AU

Angular distance to the primary (M):
$0° < M < 360°$ $\Delta M=1°$



Integrationmethod:

Burlirsch-Stoer-Integrator
(Áron Süli)

Stability:

1) Maximum Eccentricity (max_e)
2) Lyapunov Indicator (LCI)

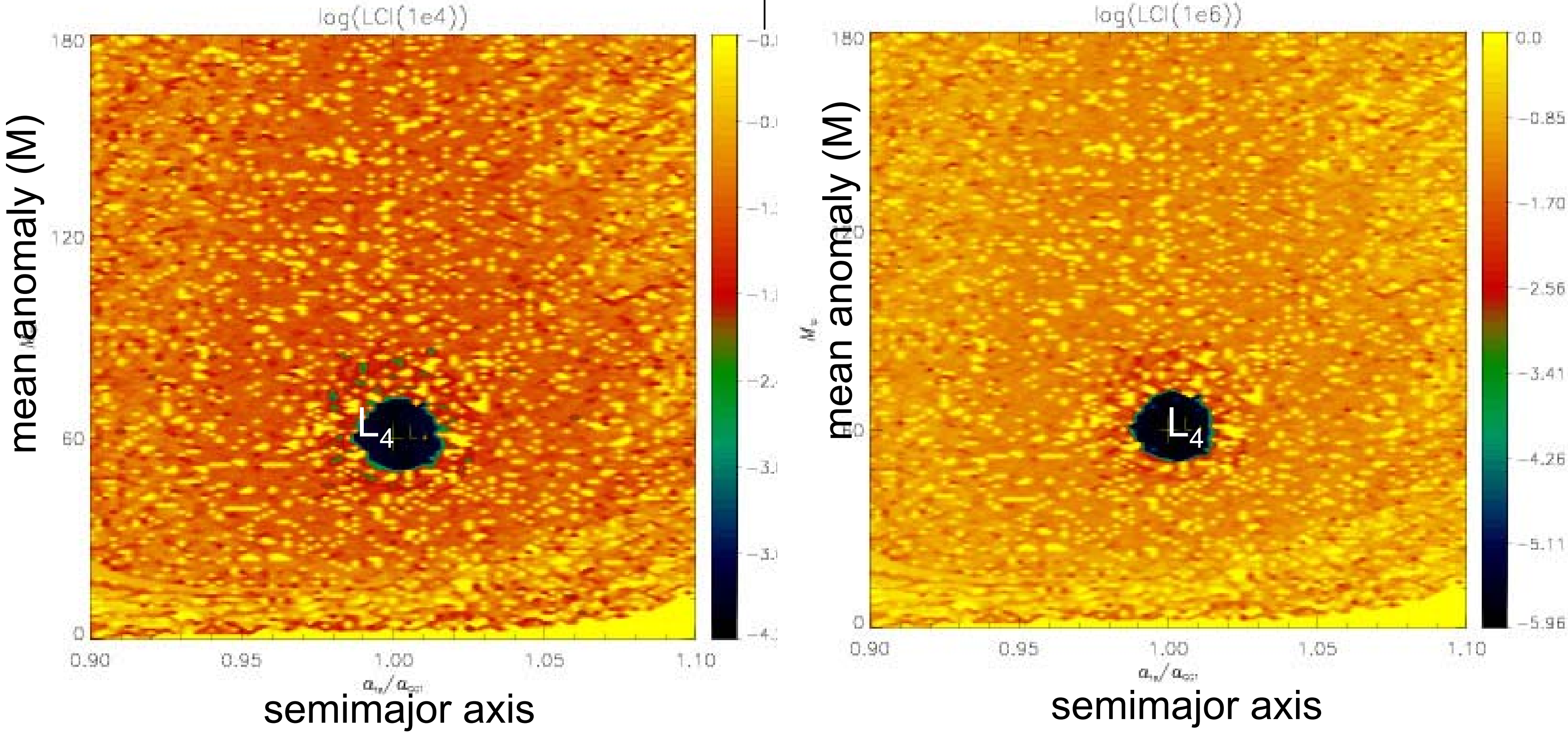
HD 17051: comparison of the results of different computation times:

Spec. G0V

LCI (log.)

10^4 revolutions

10^6 revolutions



a=0,91AU μ=0,001795

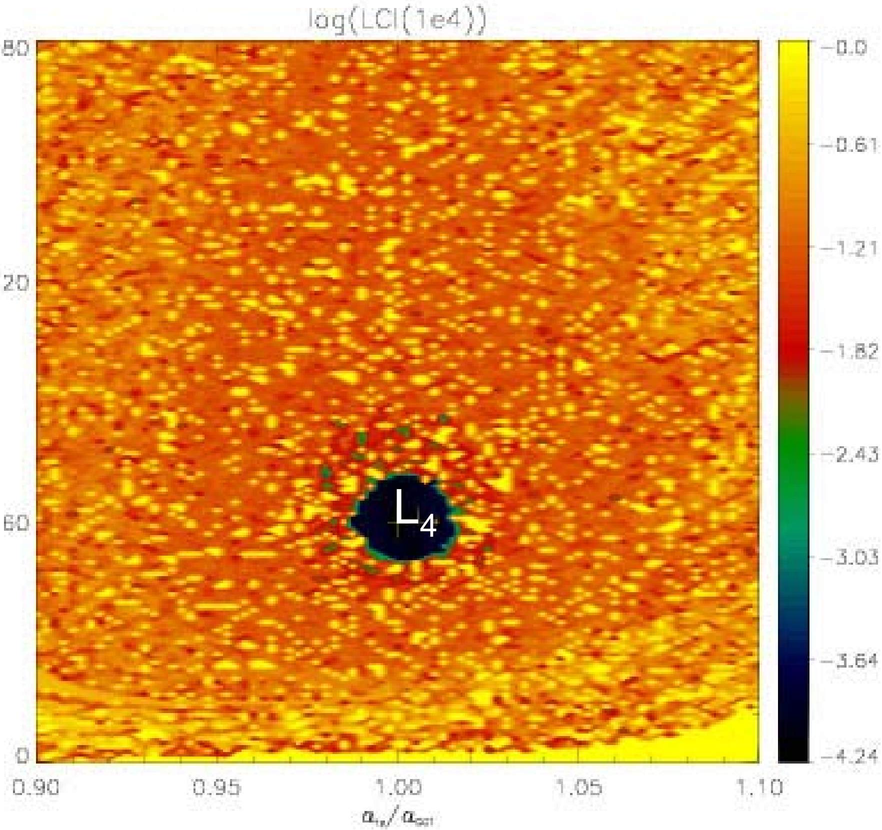
e=0,24 ω=343°

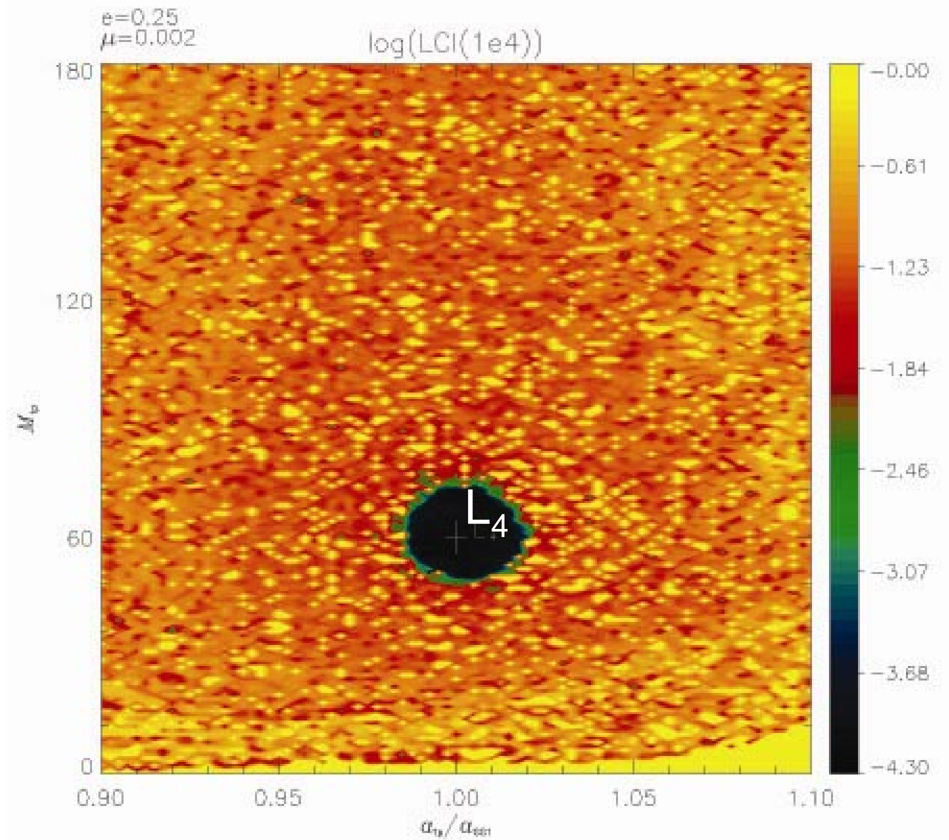
HD 17051

Catalogue

Spec. G0V

Integration time 10^4 revolutions





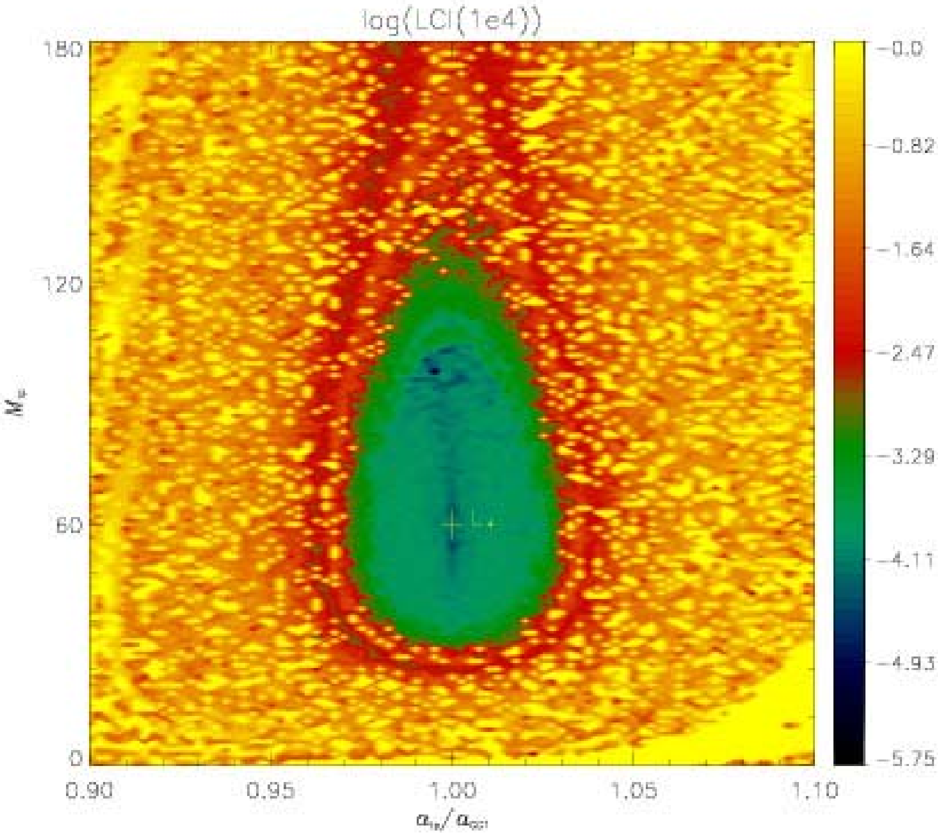
a=0,91AU μ=0,001795
e=0,24 ω=343°

e=0,25
μ=0,002

HD 93083

Spec. K3V

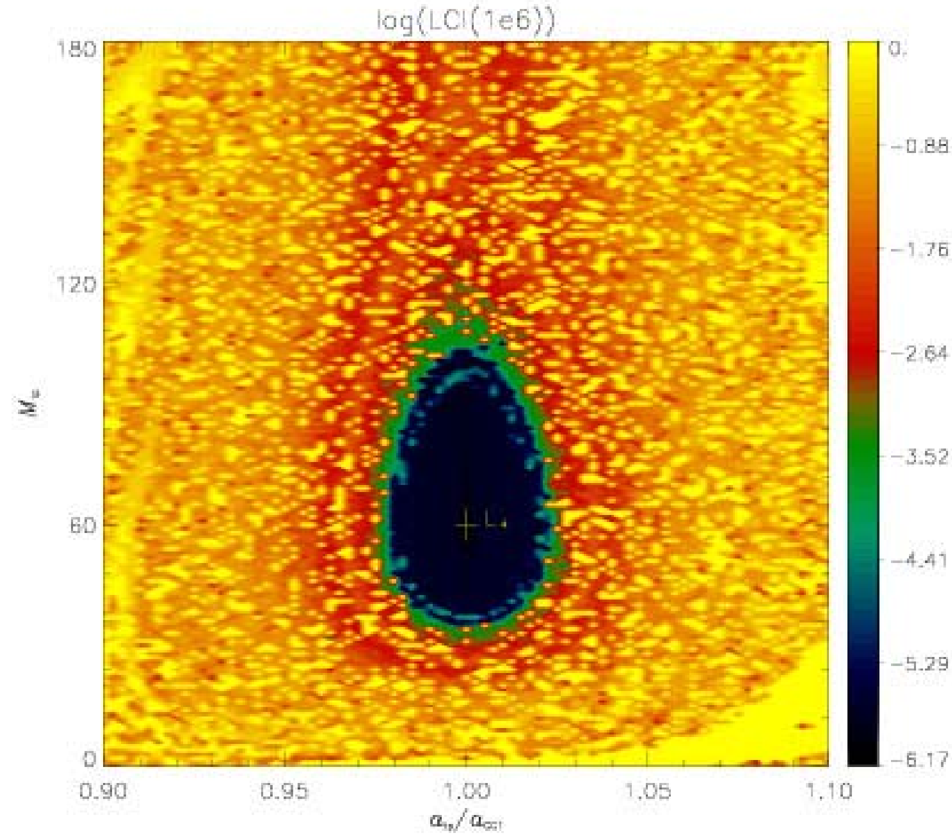
Integration time **10^4** rev



a=0,48AU μ=0,00050437

e=0,14 ω=333,5°

Integration time **10^6** rev

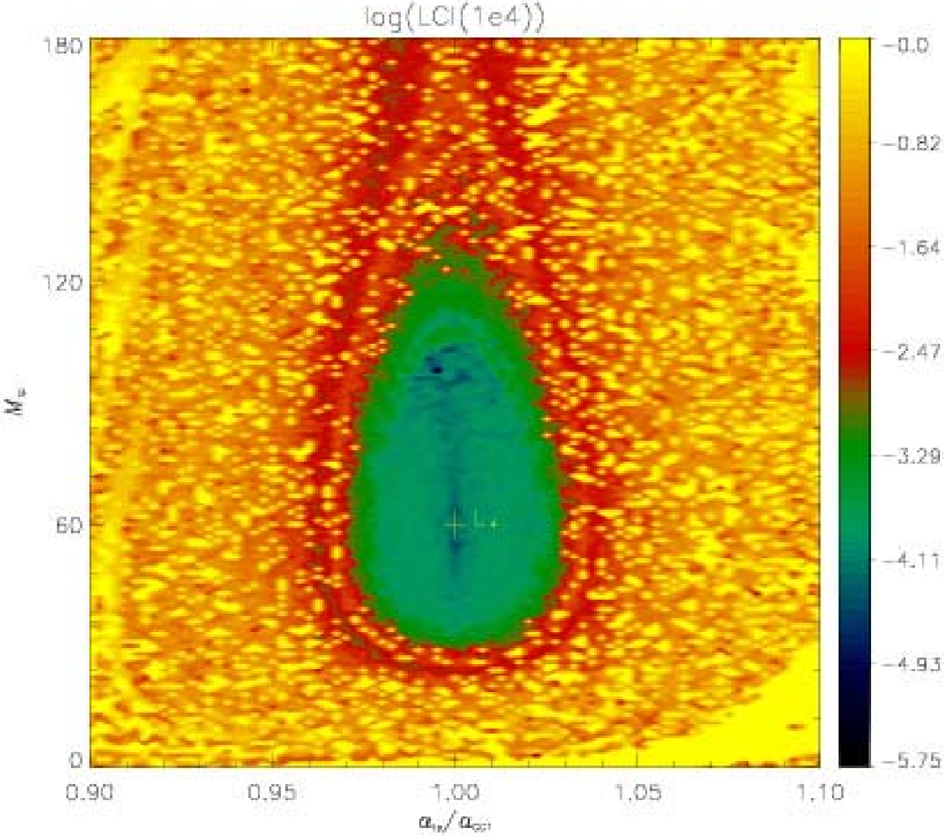


e=0,15

μ=0,0005

HD 93083

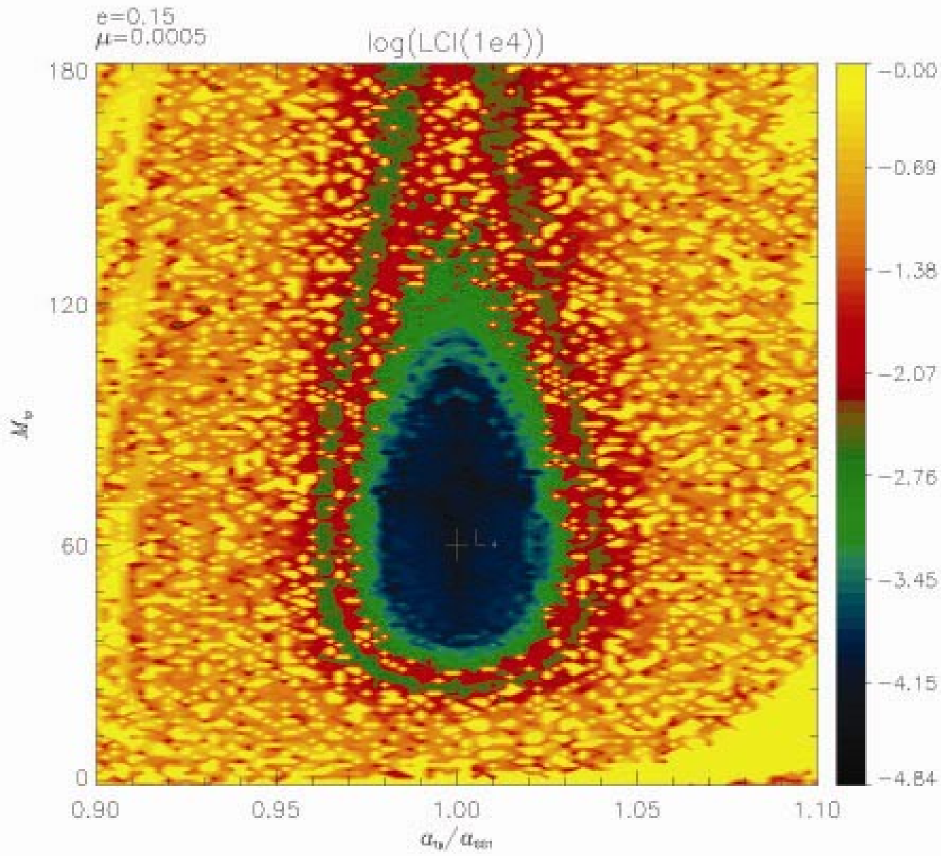
Spec. K3V



a=0,48AU μ=0,00050437

e=0,15 ω=333,5°

Catalogue



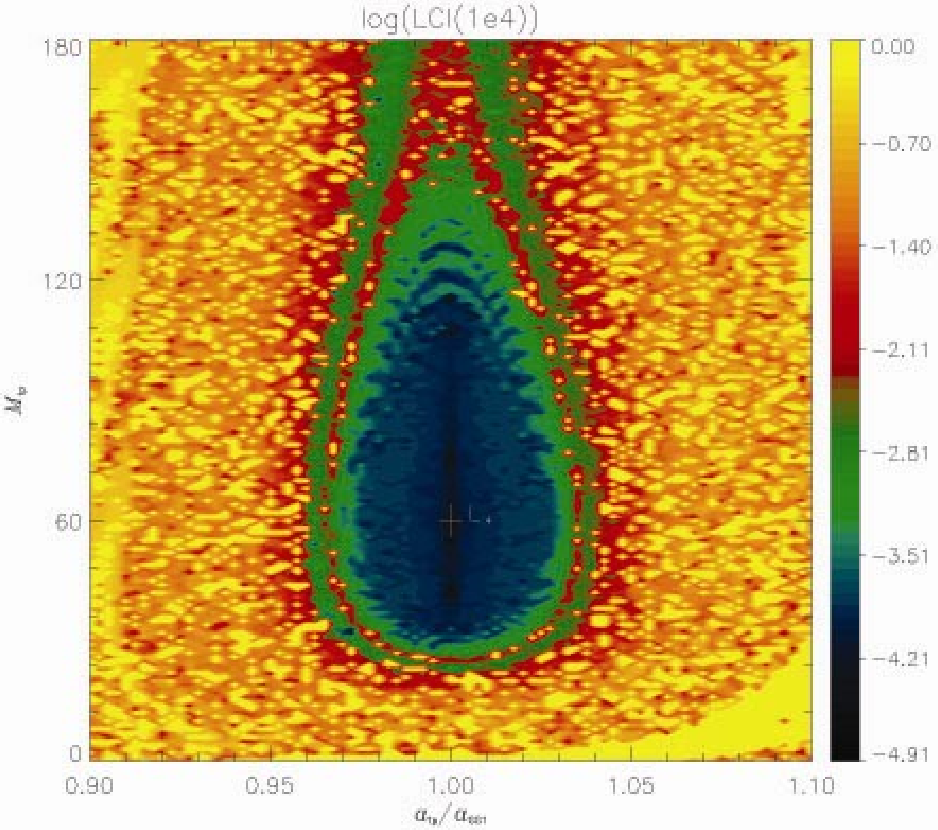
e=0,15

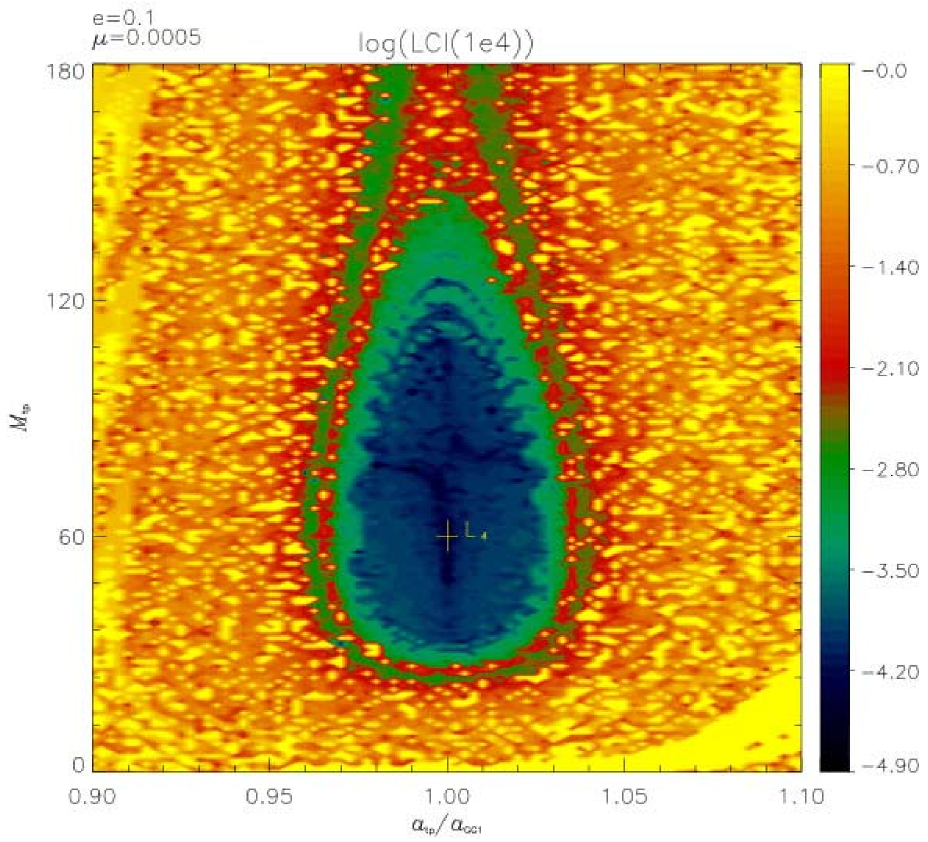
μ=0,0005

HD 99109

Catalogue

Spec. K0





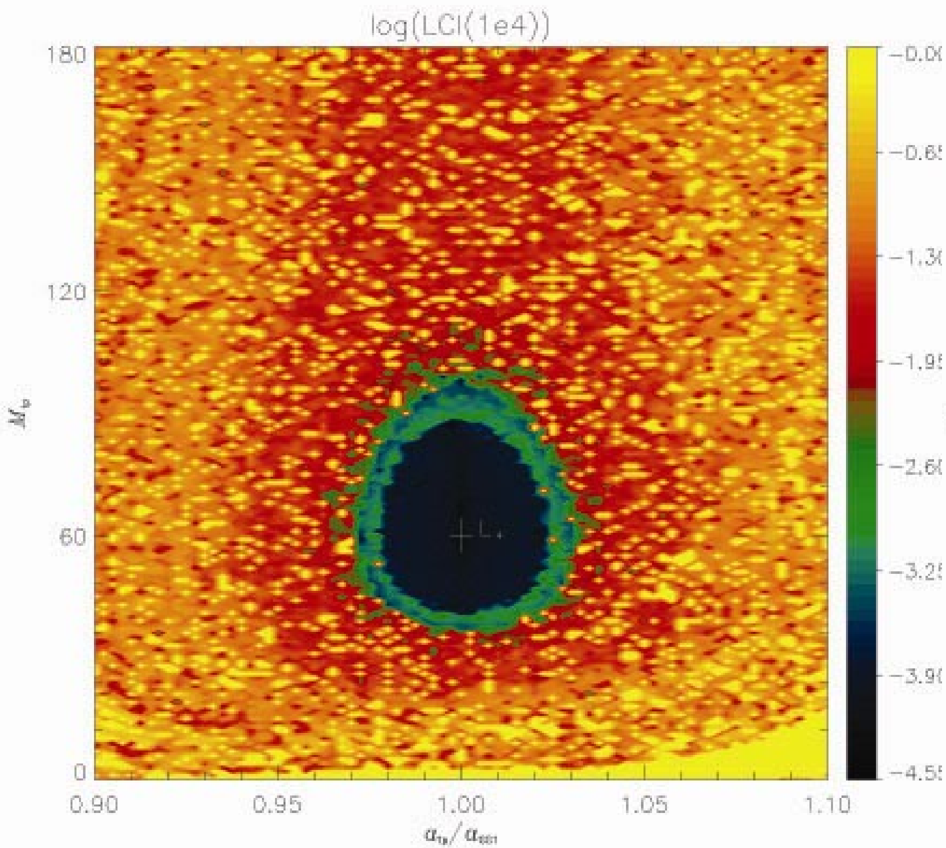
a=1,105AU μ=0,00051507
e=0,09 ω=256°

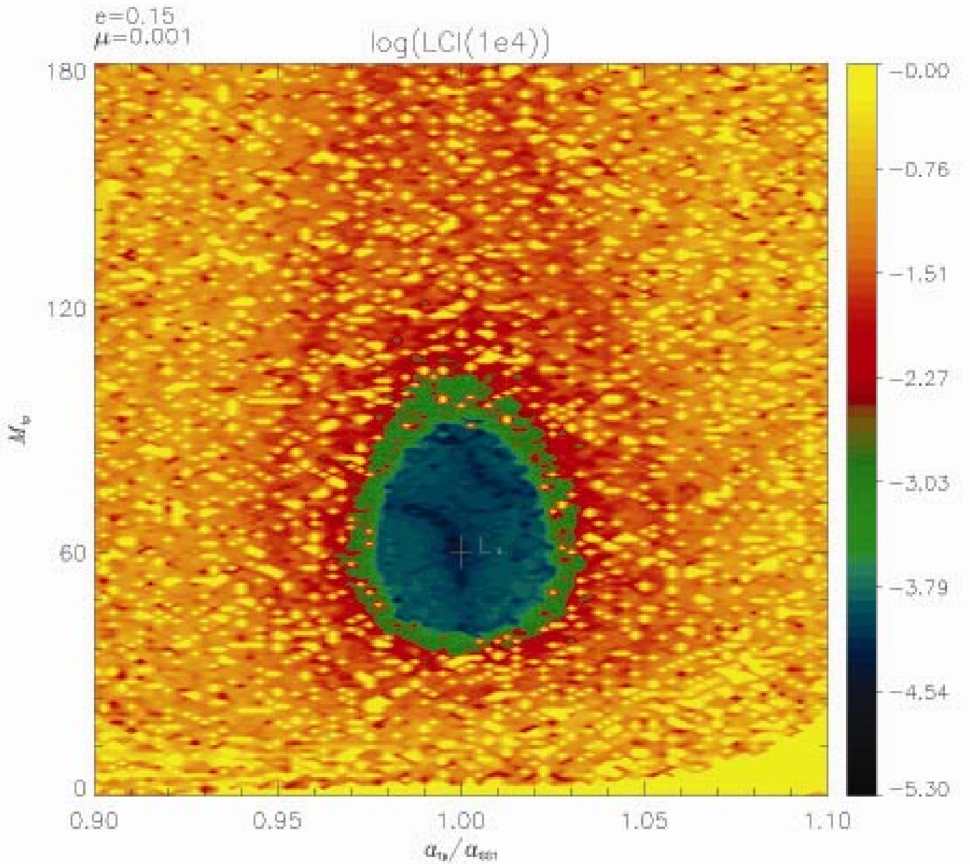
e=0,1
μ=0,0005

HD 188015

Catalogue

Spec. G5IV





a=1,19AU μ=0,00111258

e=0,15 ω=393°

e=0,15

μ=0,001