MOCCA code & N-BODY code Comparison

By Dongming Jin

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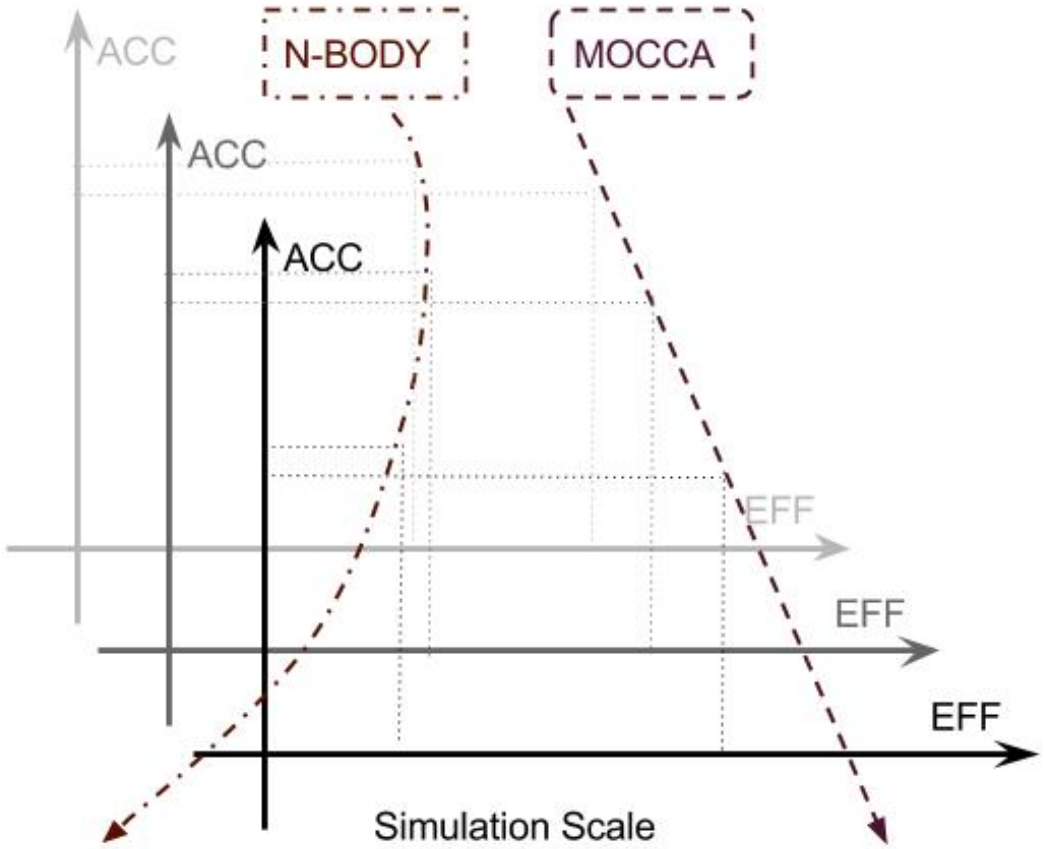
CODE INTRO.

- N-BODY 6 Version 7.3.0 12/2009; Peter Berczik
- N-BODY 6++ Version 61 05/2013; Rainer Spurzem
- MOCCA Giersz, Heggie & Hurley 2008; Mirek Giersz

PROS & CONS

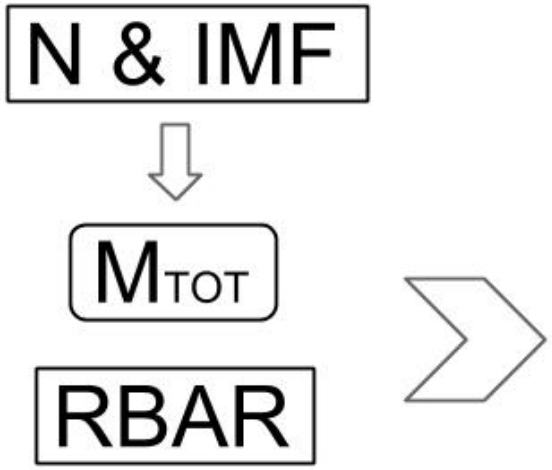


COSTING

N-BODY	MOCCA
72 hours	4 hours
2000 N-BODY Time ～132 Myrs – 228 Myrs	20 Gyrs
Cluster	Desktop

N-BODY SCALING

G=1 M=1 E=-0.25



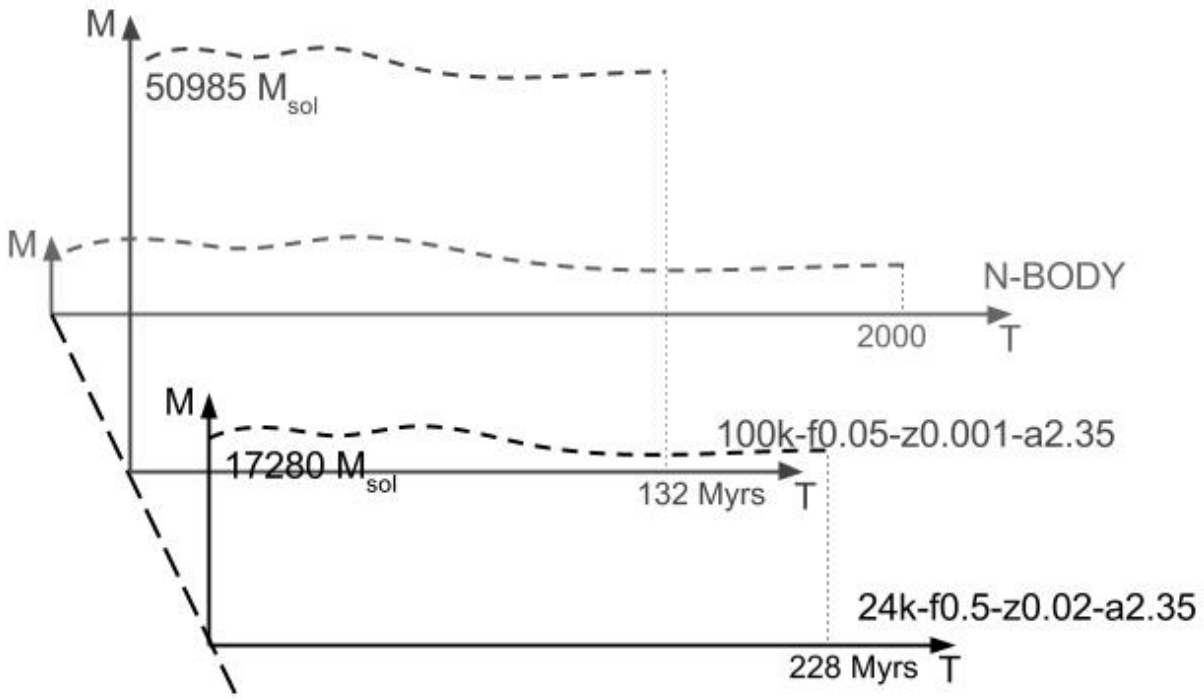
$$R^* = RBAR \quad pc$$

$$M^* = M_{TOT} \quad M_{sol}$$

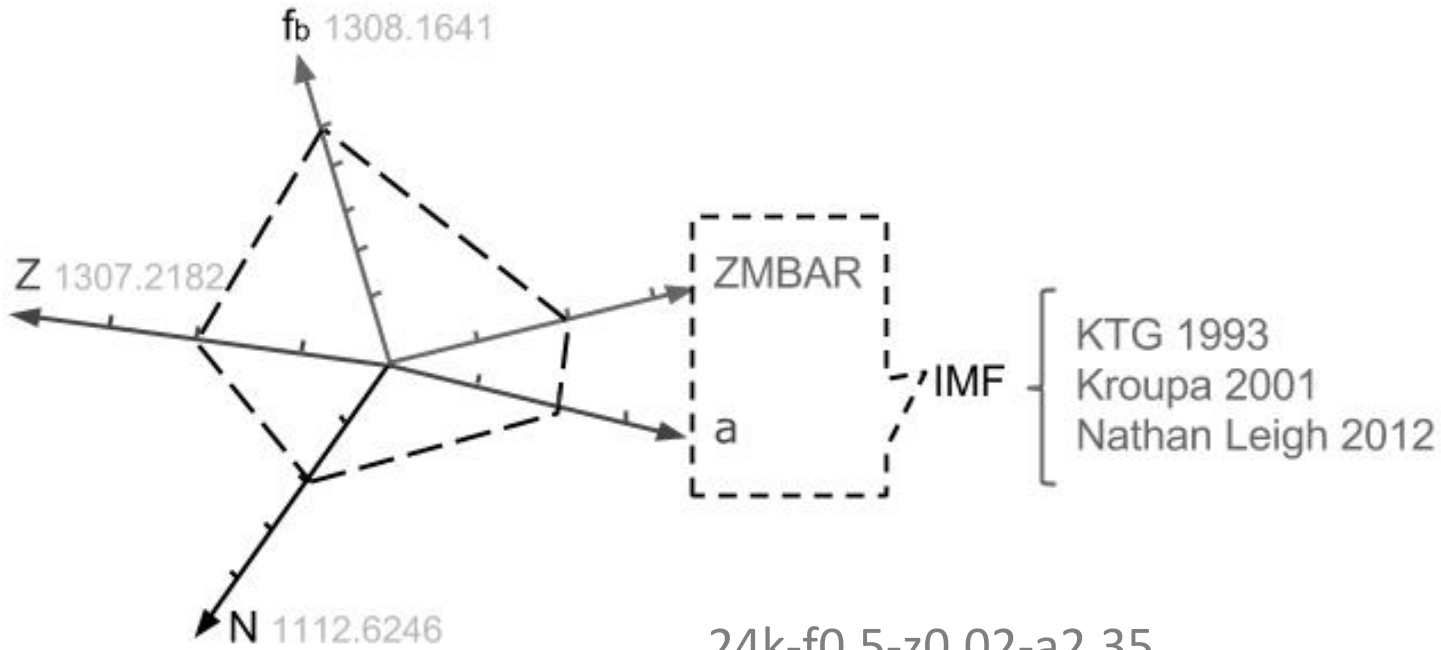
$$T^* = 15 * \sqrt{RBAR^3 / M_{TOT}} \quad Myrs$$

$$V^* = 0.066 * \sqrt{M_{TOT} / RBAR} \quad km/s$$

VISUAL SCALING

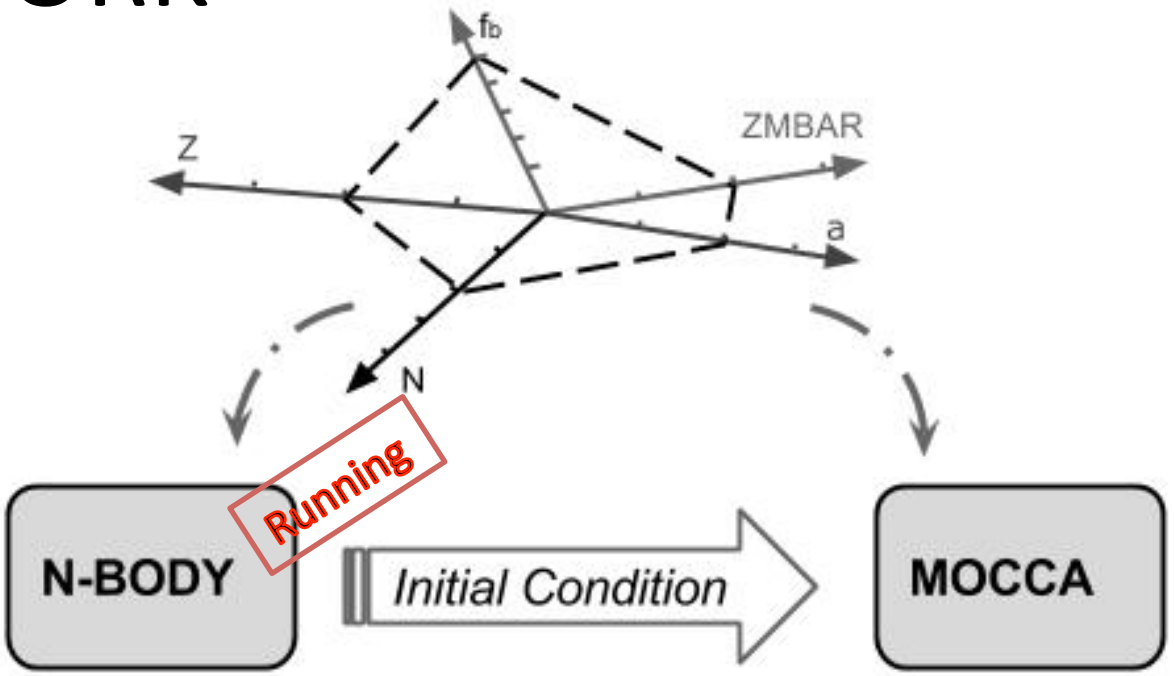


MODELS



24k-f0.5-z0.02-a2.35

MY WORK



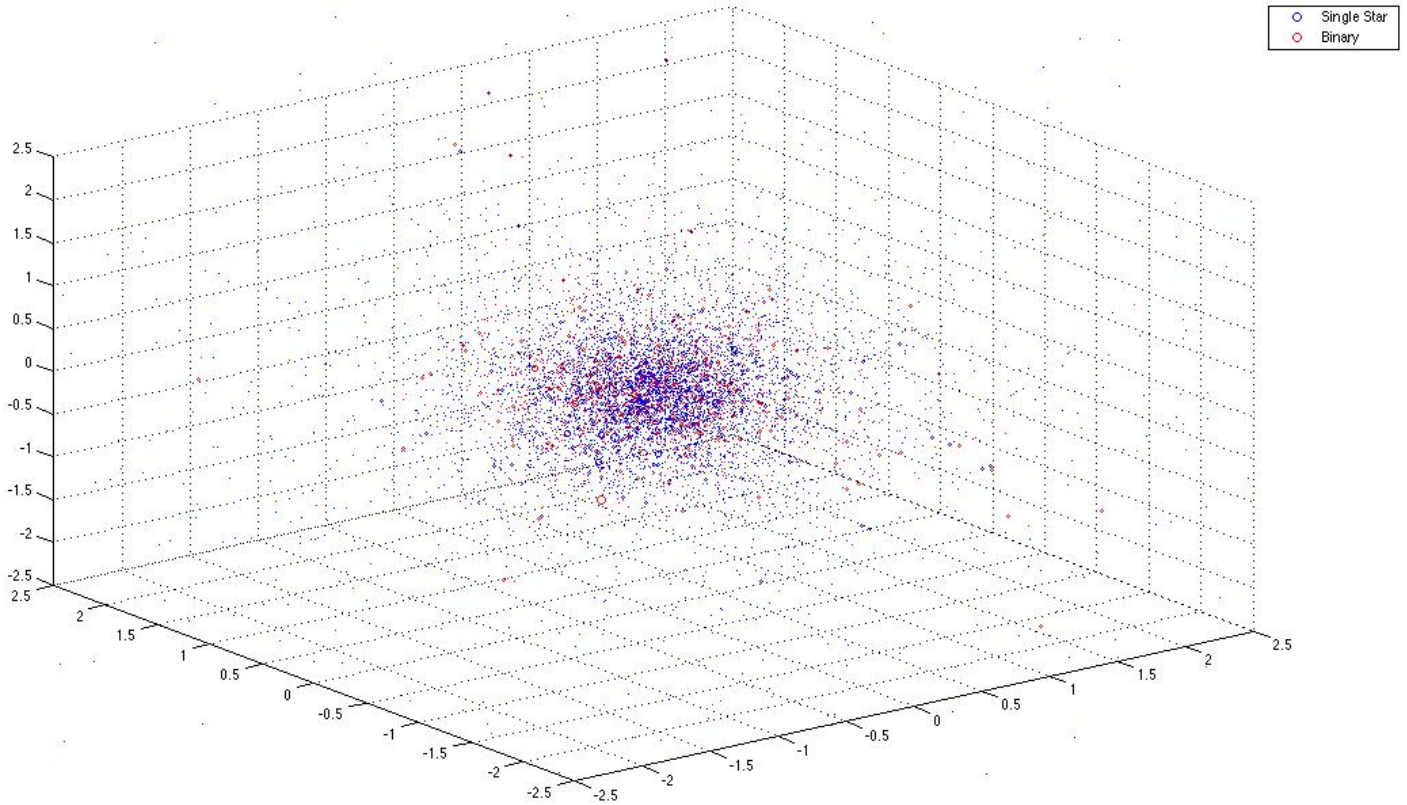
Star Evolution

Binary Evolution

Cluster Evolution

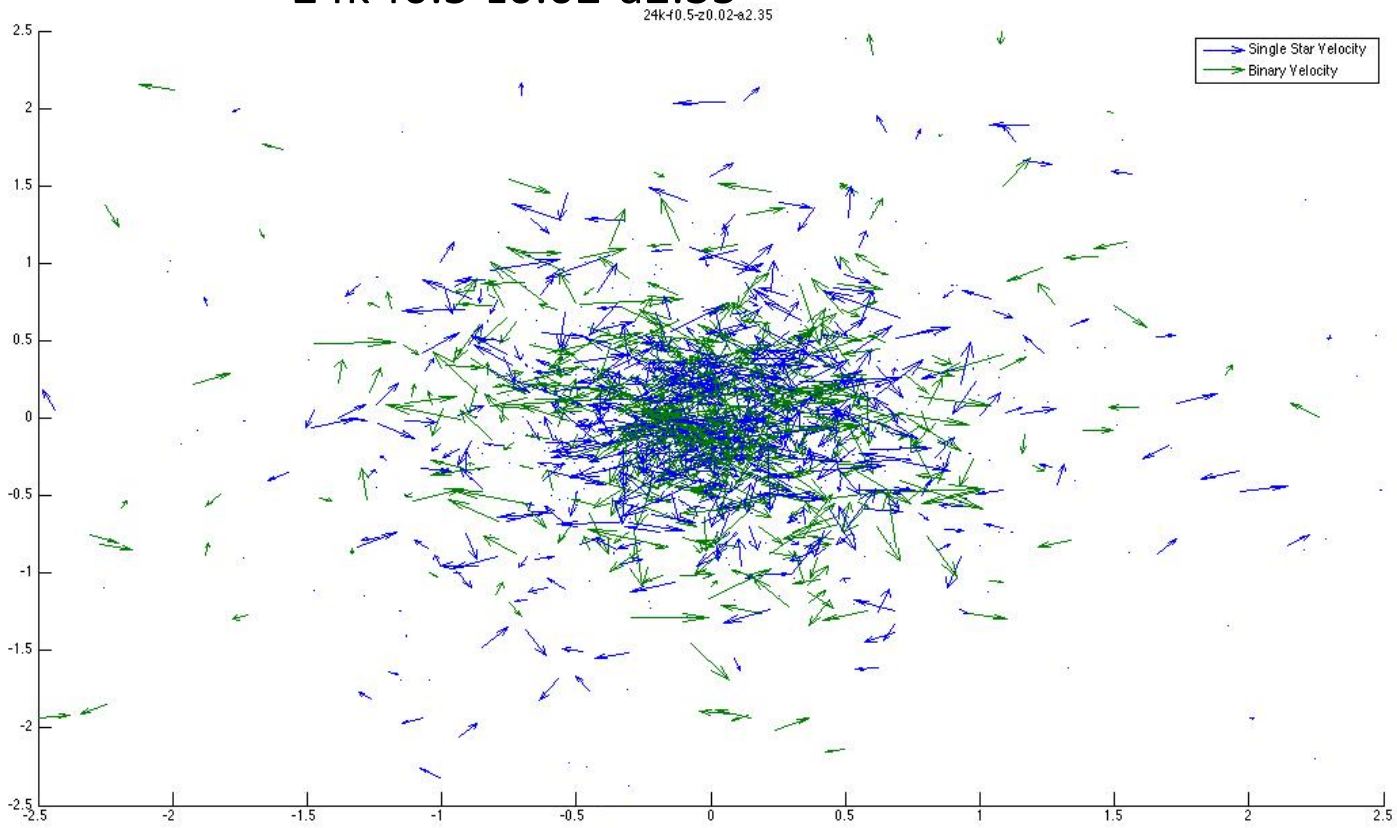
INITIAL POSITION

24k-f0.5-z0.02-a2.35



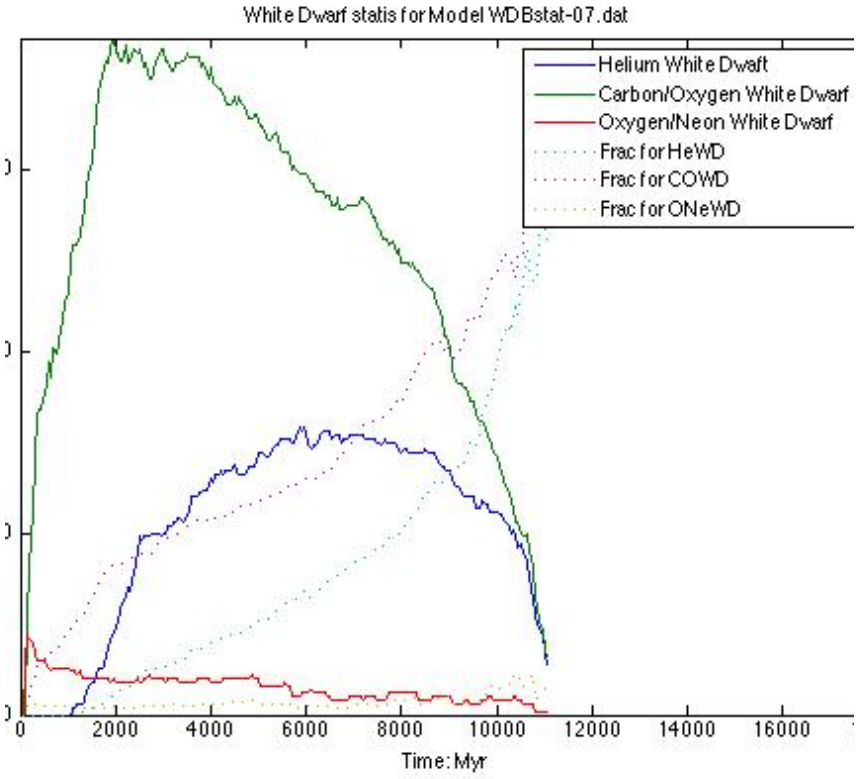
INITIAL VELOCITY

24k-f0.5-z0.02-a2.35

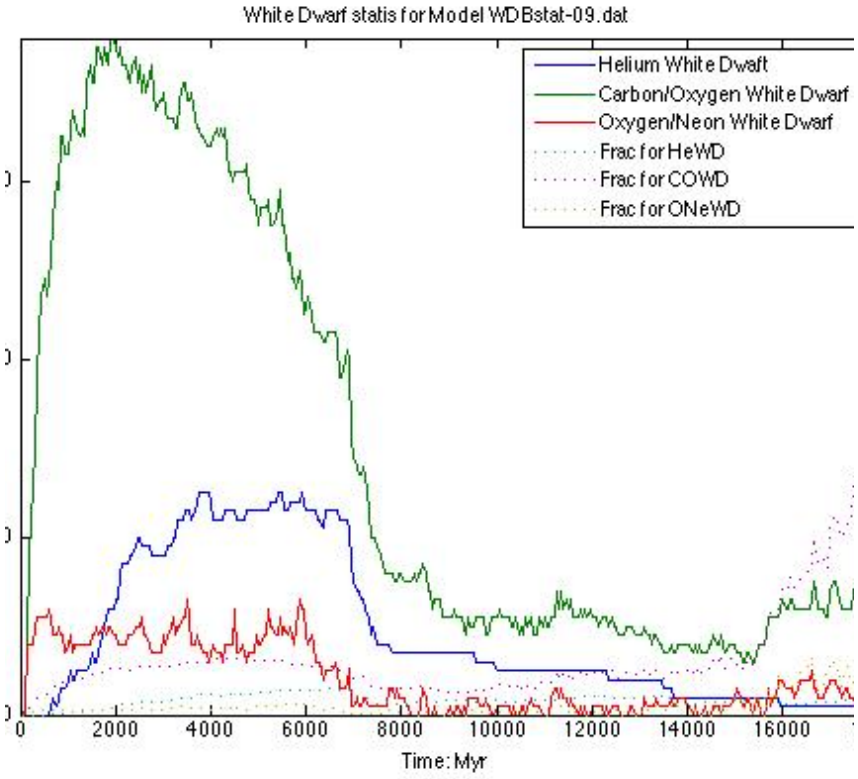


STAR EVOLUTION

24k-f0.5-z0.02-a2.35

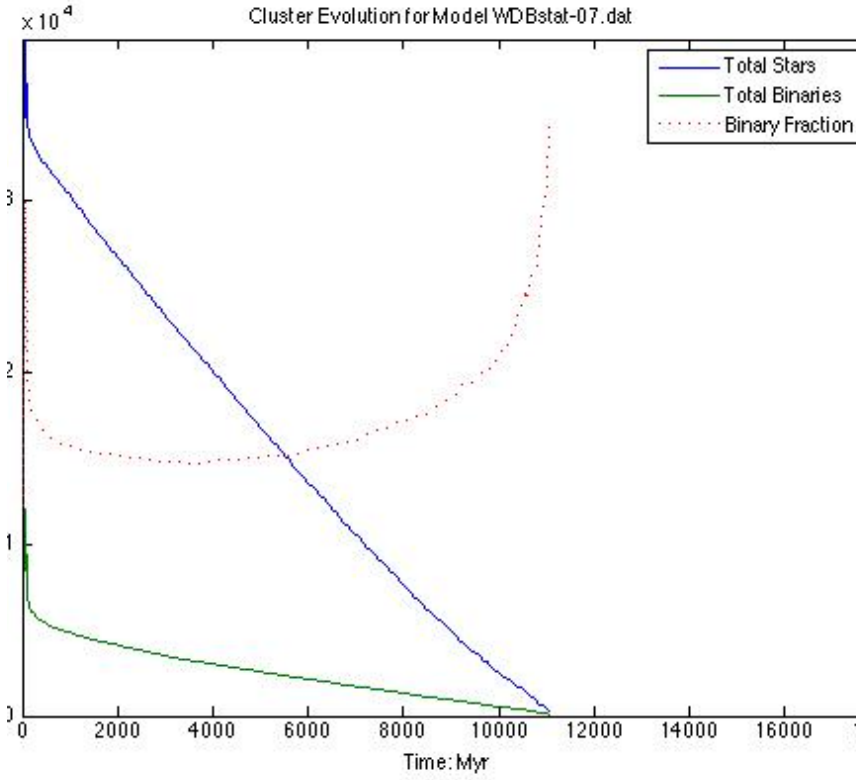


100k-f0.05-z0.001-a2.35

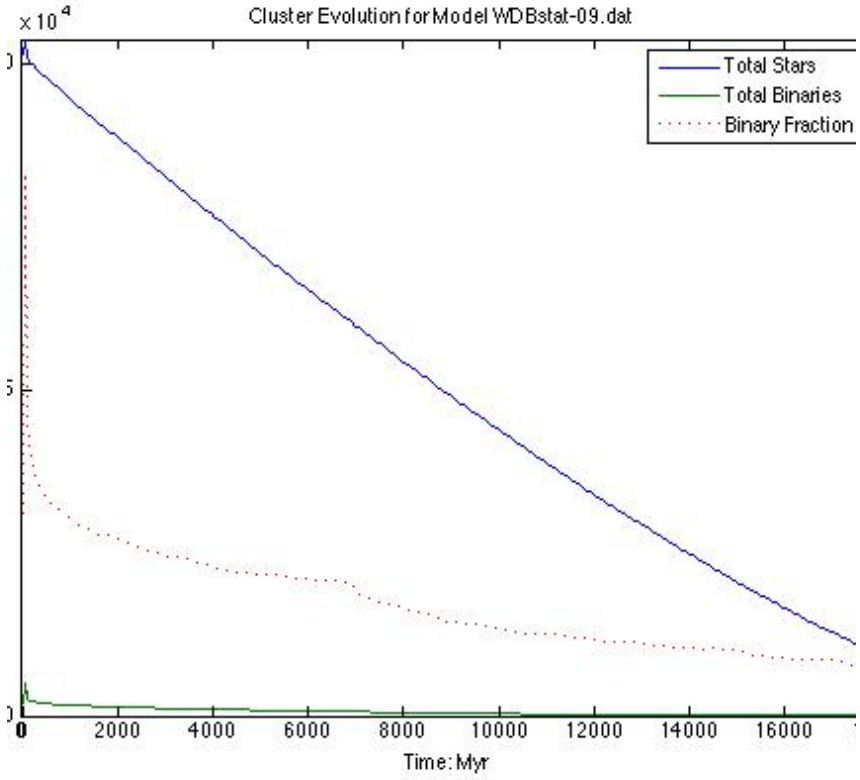


BINARY EVOLUTION

24k-f0.5-z0.02-a2.35

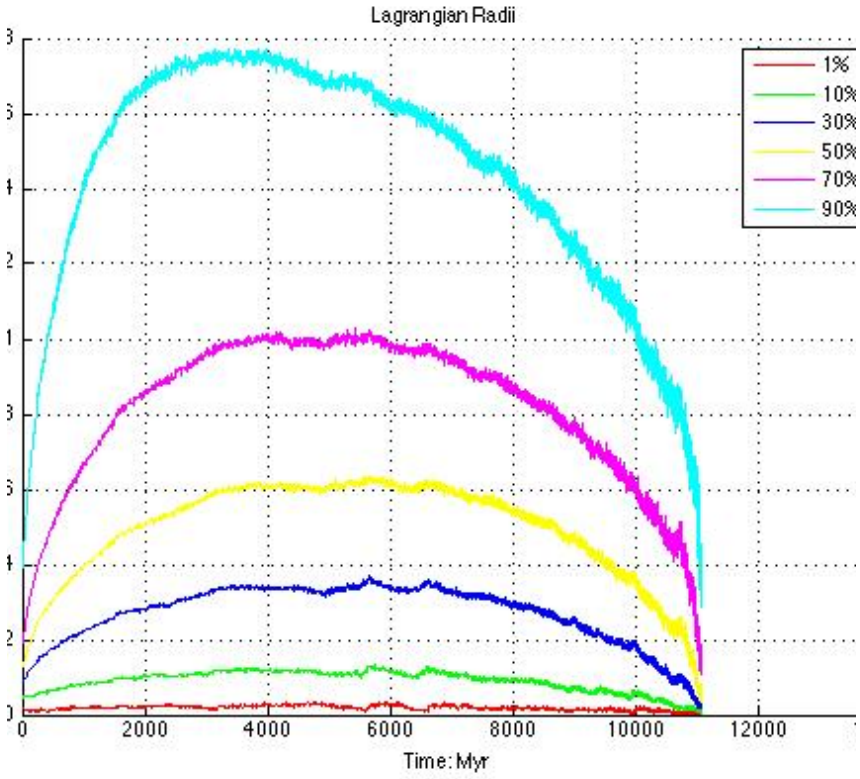


100k-f0.05-z0.001-a2.35

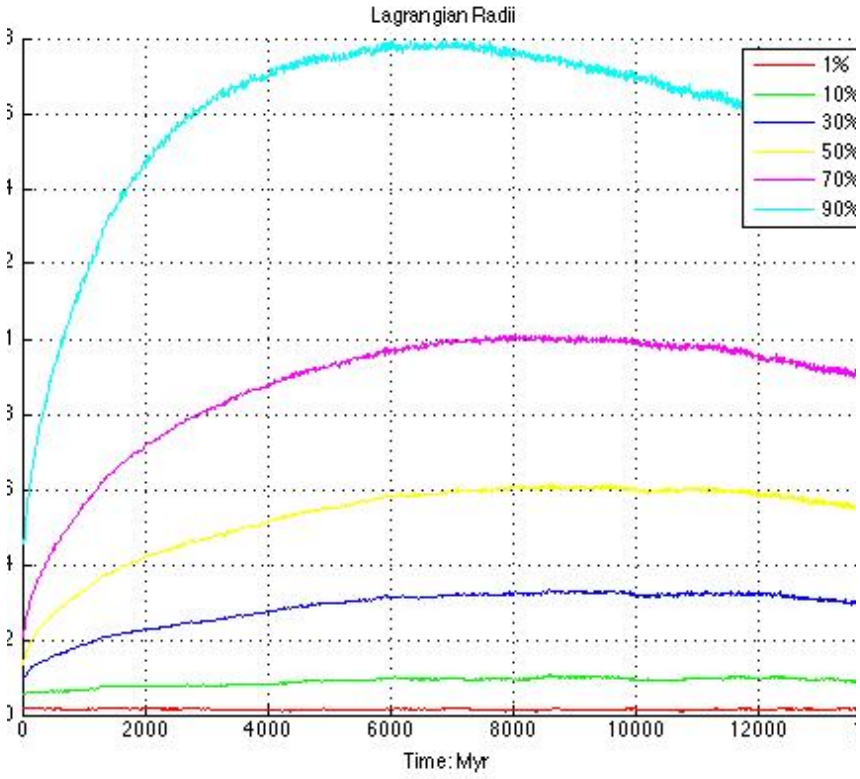


CLUSTER EVOLUTION

24k-f0.5-z0.02-a2.35



100k-f0.05-z0.001-a2.35



SUMMARY

- N-body Status
  - 100k: 13086 -> 863 Myrs
  - 24k: 7597 -> 866 Myrs

- Initialization
  - Eccentricity
  - Semi-major

FUTURE

- B.H. merger
- Collisions
- Binary
  - Interaction
  - Evolution
  - Formation

THANK YOU

Advisor: Matthew Benacquista

MOCCA: Mirek Giersz

N-BODY: Rainer Spurzem

Kepler: Peter Berczik