



Directly determining fundamental properties
of low mass stars/ brown Dwarfs

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CASS Project Description

Astronomy Jargon

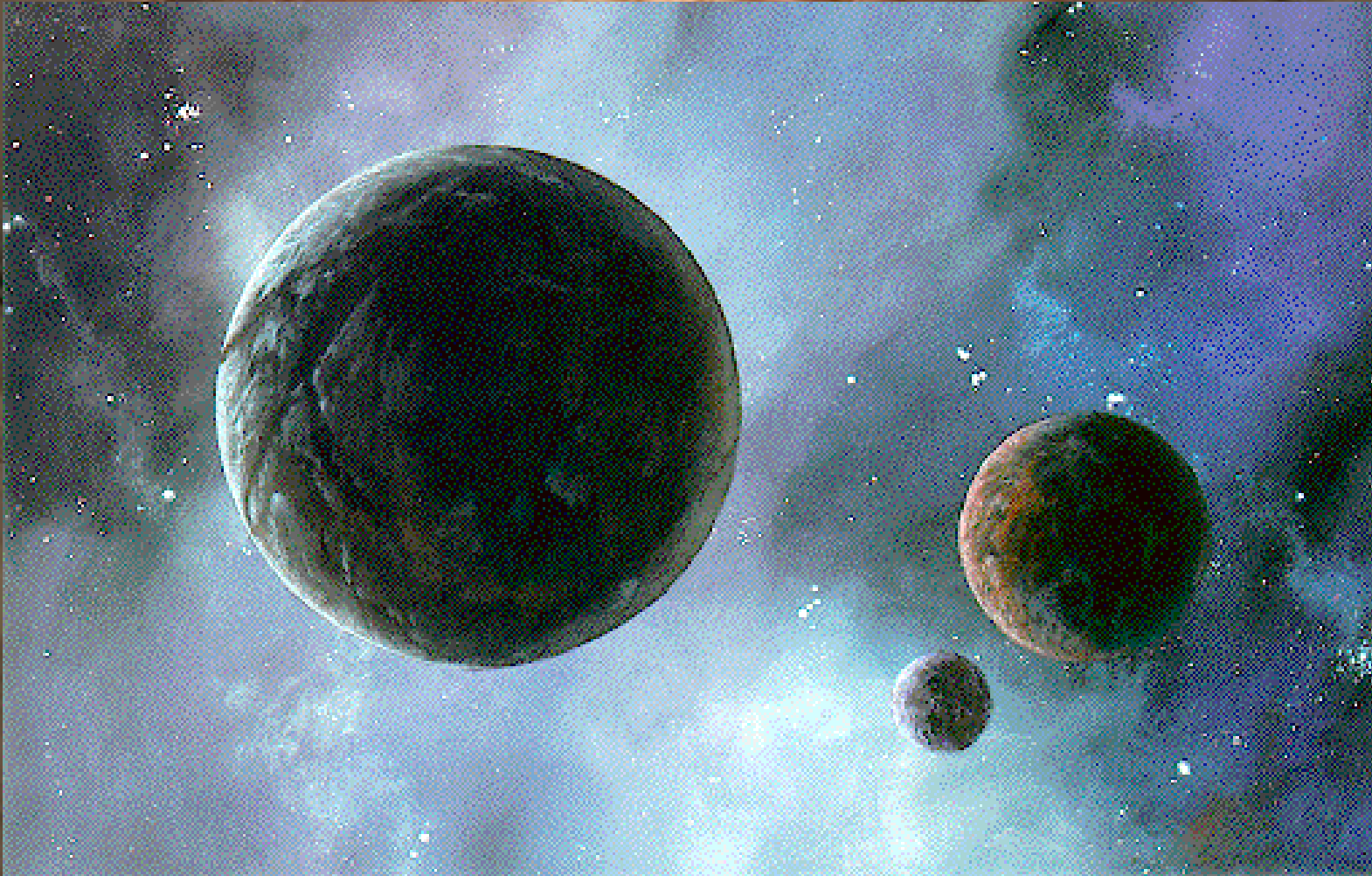
Brown Dwarfs not ~~Brown Dwarves~~

	<i>-ves</i>	<i>-fs</i>
<i>dwarf</i>	38%	62%
<i>wharf</i>	79%	21%
<i>hoof</i>	83%	17%
<i>scarf</i>	96%	4%

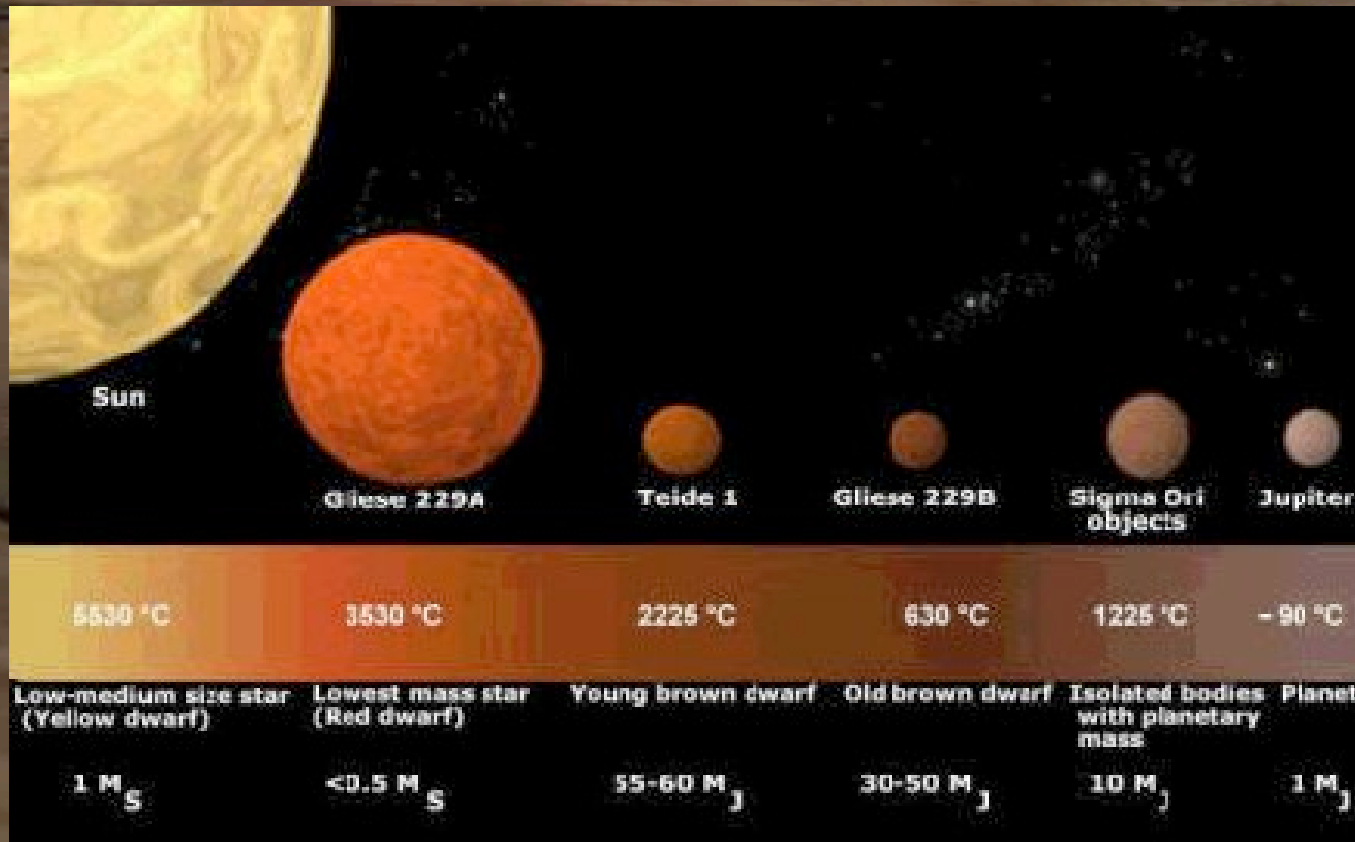
Dwarves



Dwarfs

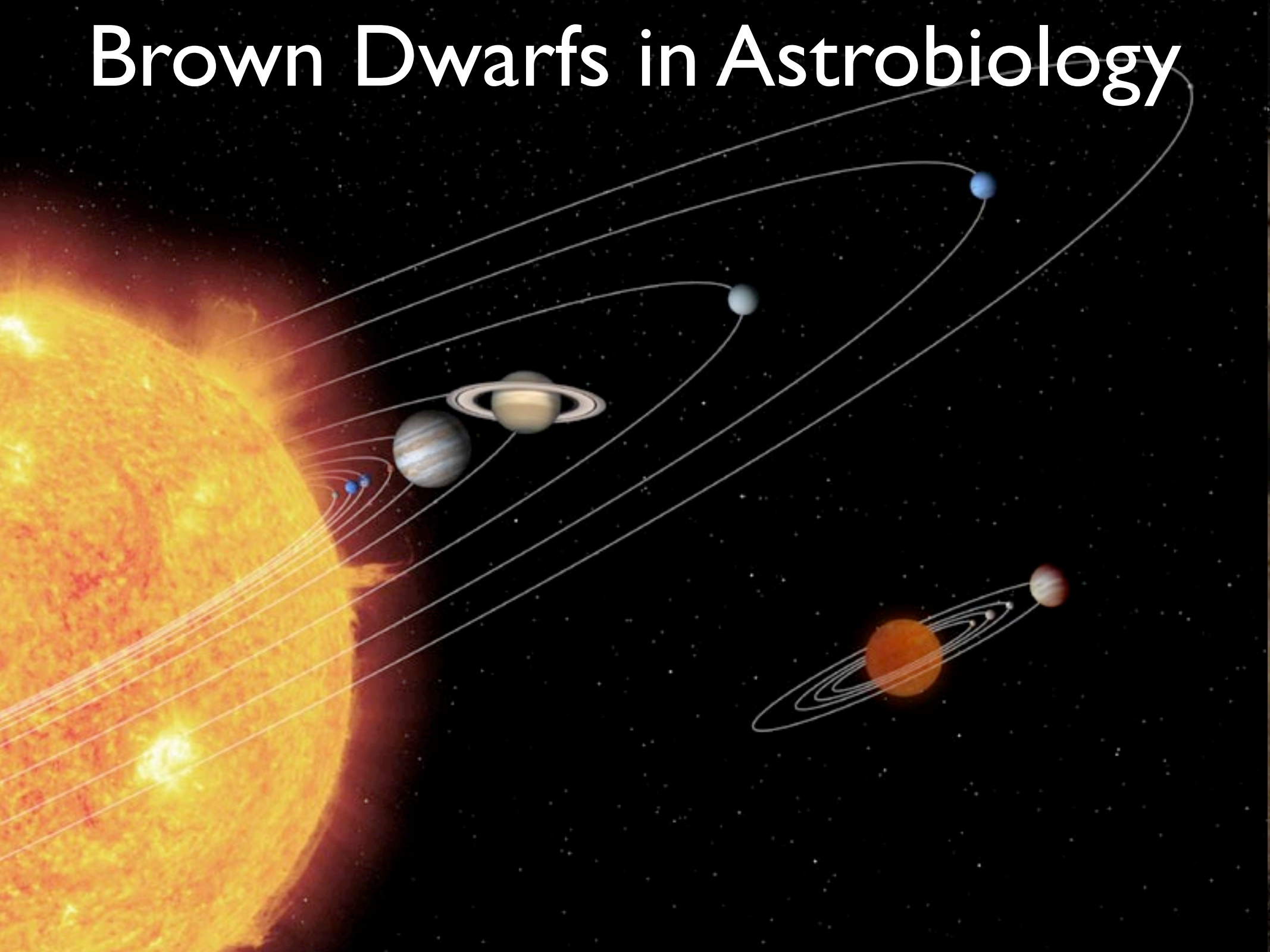


What is a Brown Dwarf

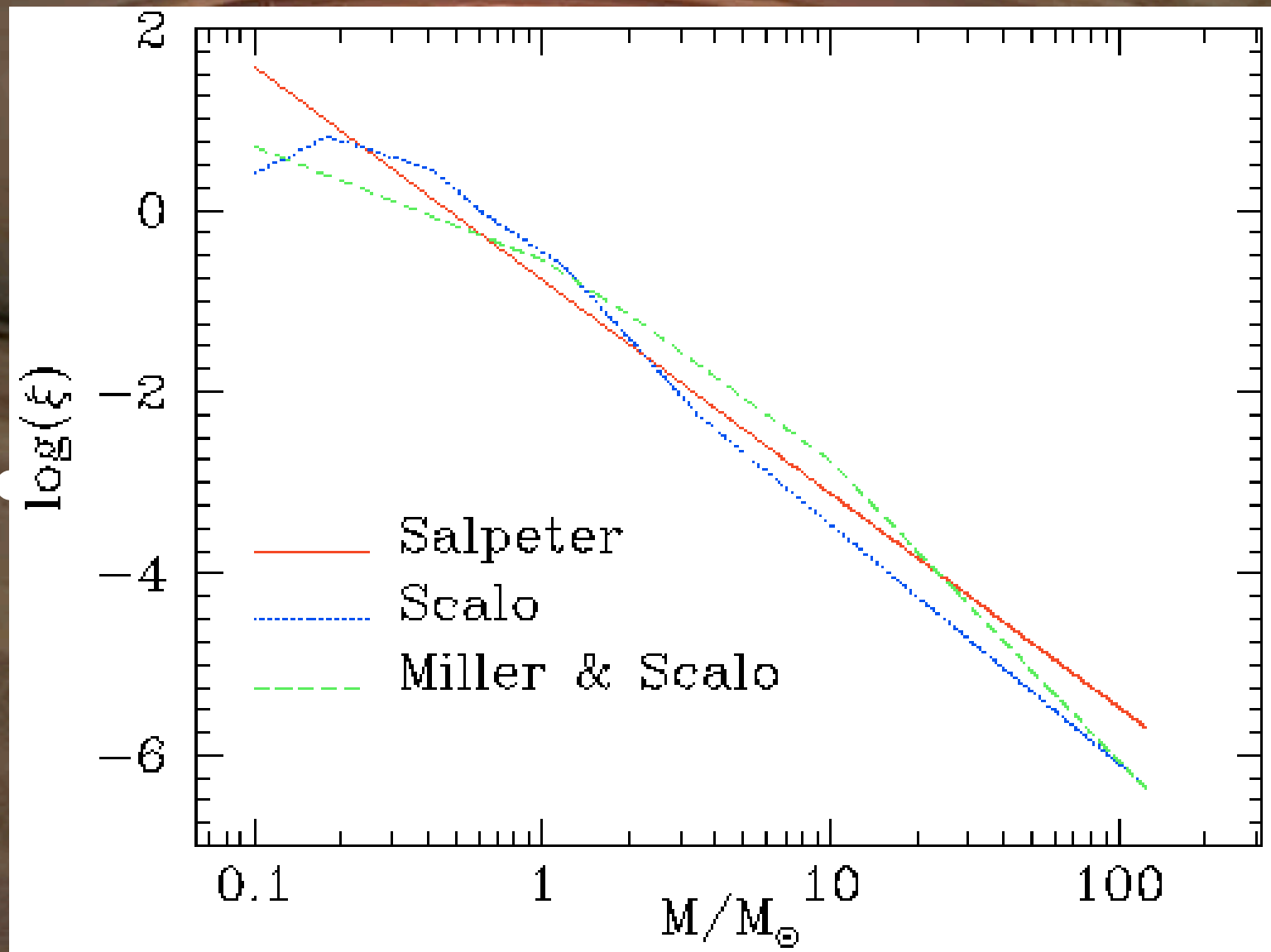


- 10 - 84 M_{jup} .01 - .084 M_{sun}
- < 3 million K to 1000 K

Brown Dwarfs in Astrobiology



As Many BD as Solar Type



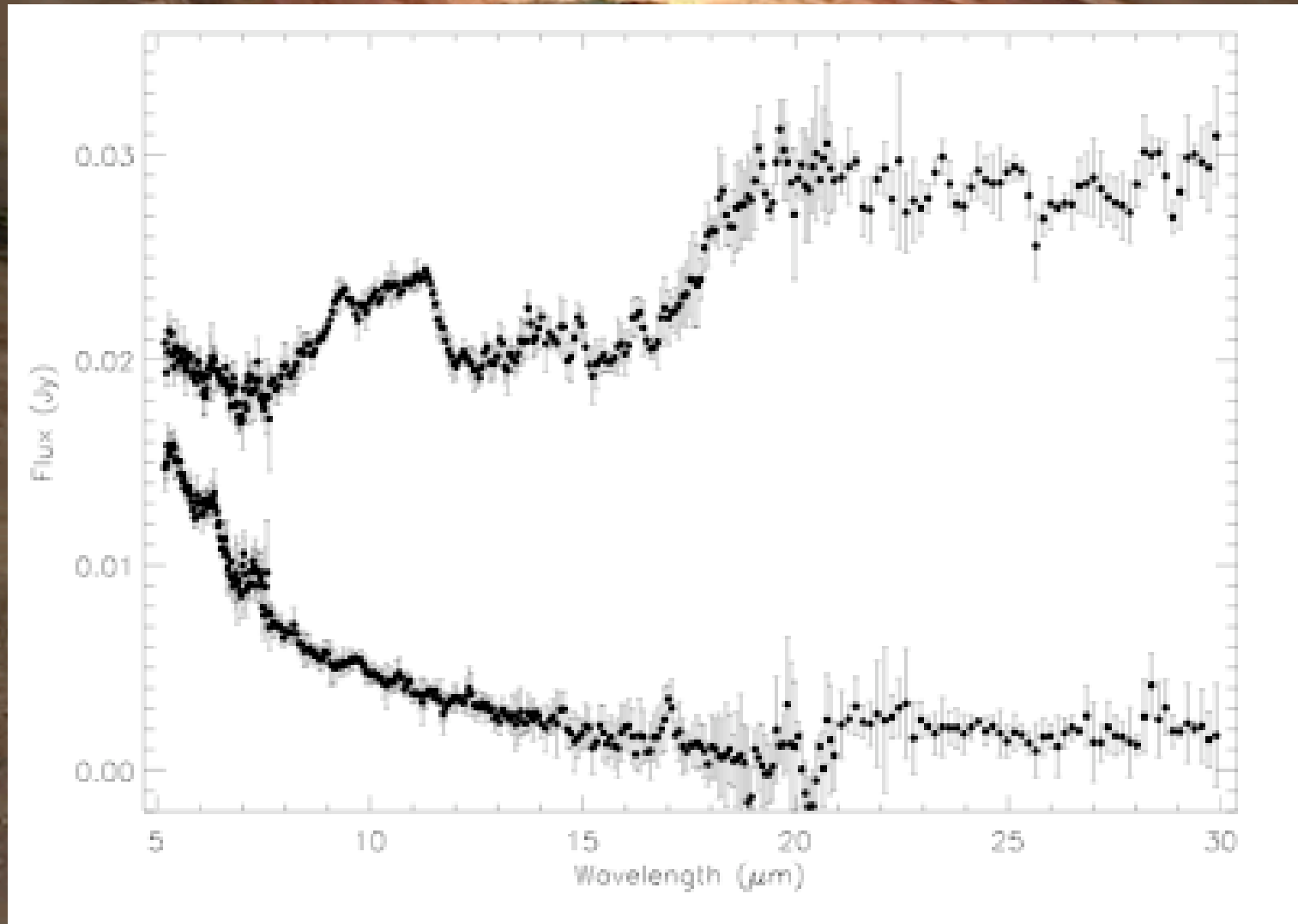


The first step

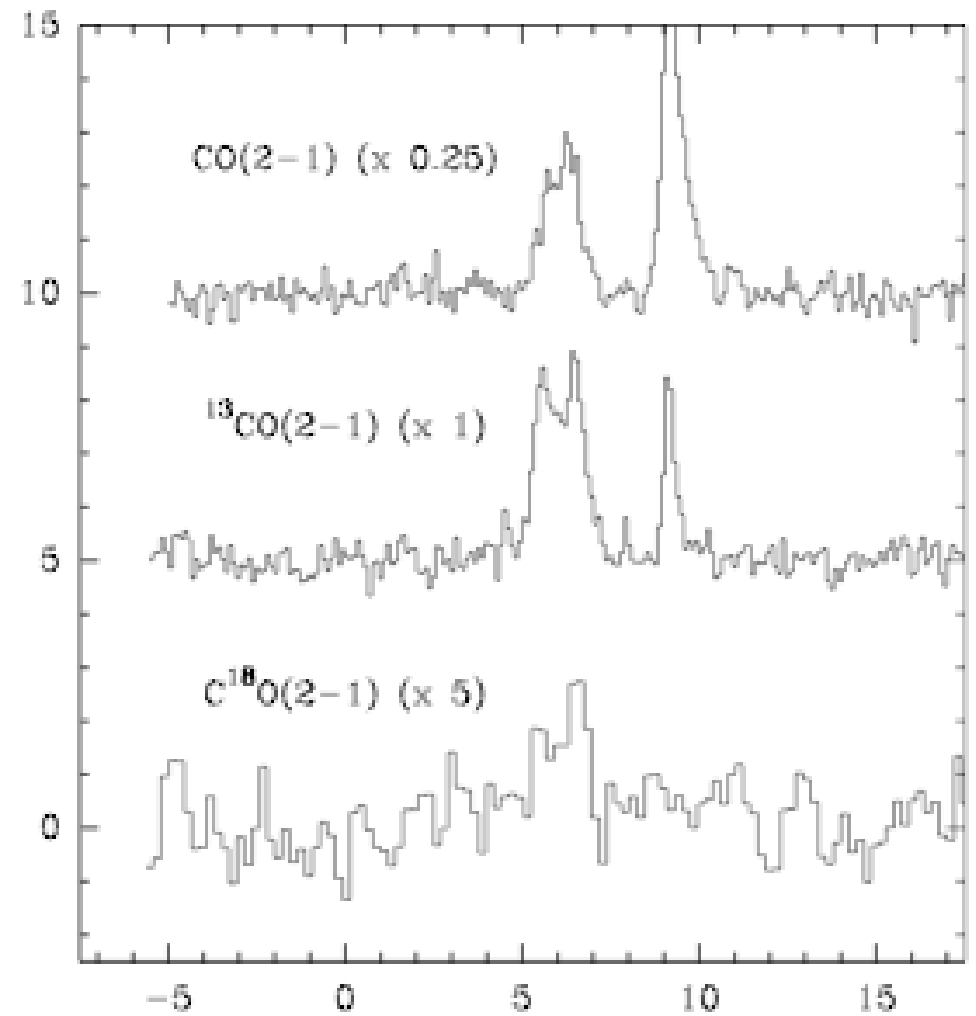
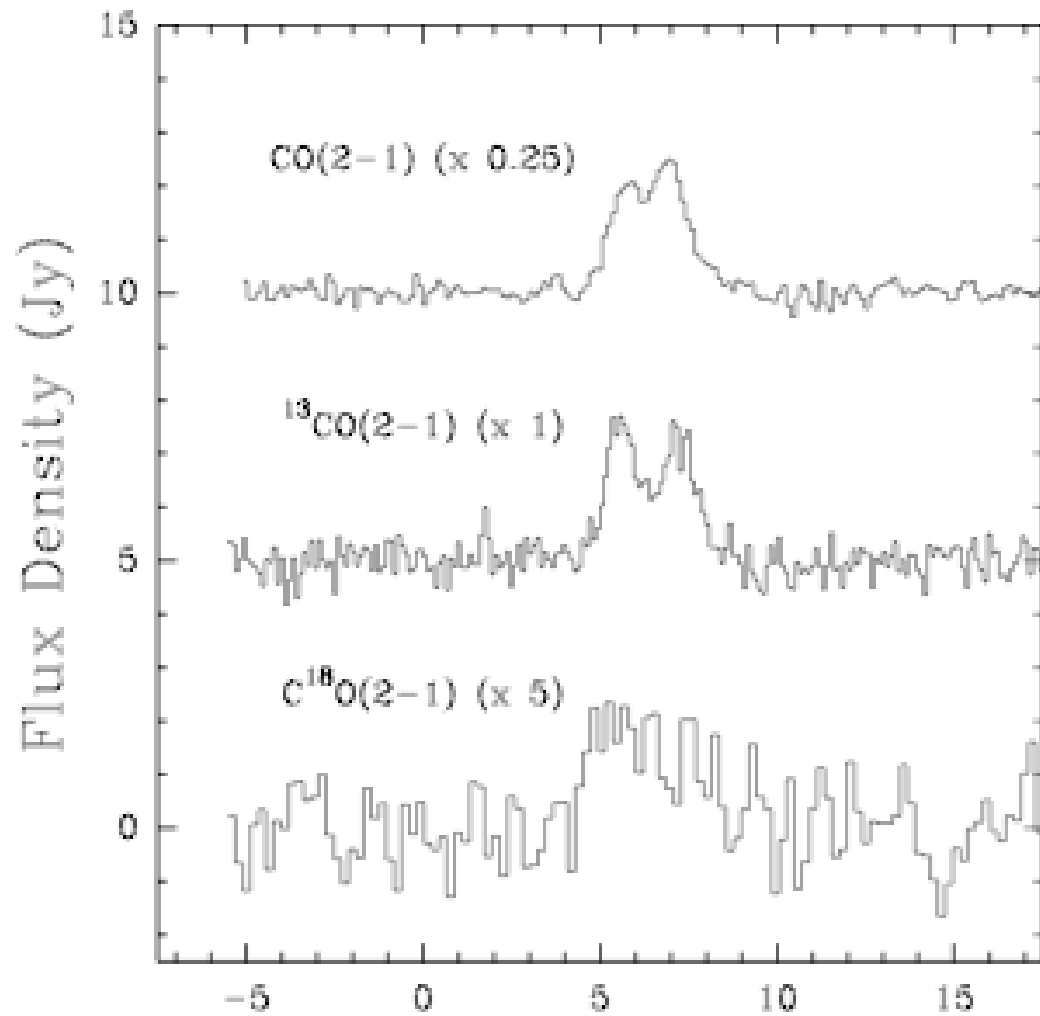
Disks around Brown Dwarfs

$$T^2 = \frac{4\pi^2}{G(M + m)} \cdot a^3$$

With Vs Without Disks



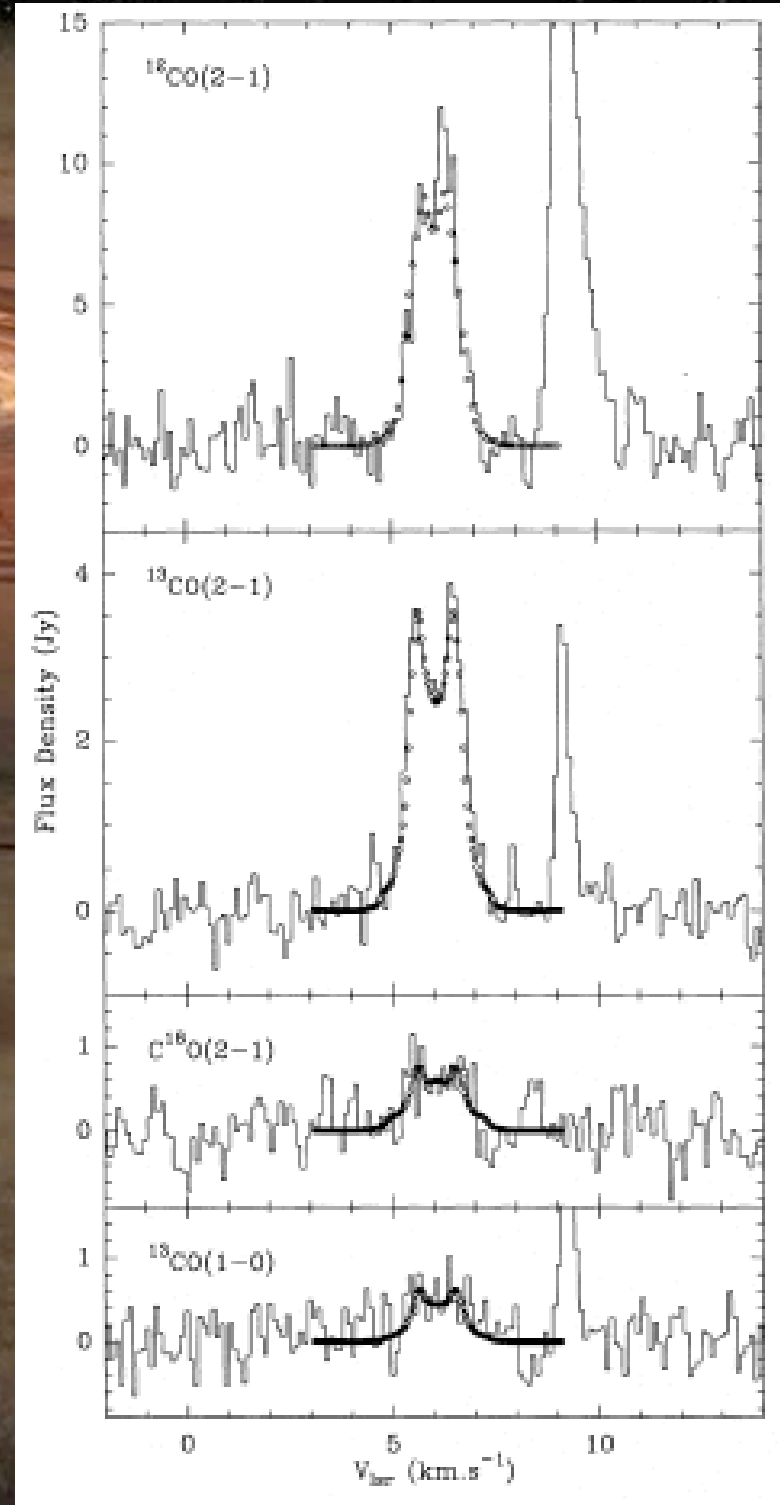
Disks !!!



Procedure

programming in C++, viewing in IDL

- Radiation Code
- Keplerian addition
- Model Data
- Chi Squared



Details....

$$S_\nu = B_\nu(T_0)(\rho\Delta V)\pi R_{\text{out}}^2/D^2\cos(i)$$

$$\Sigma(r) = \Sigma_0 r^{-p}$$

p tells us how the solar systems changes with time ie the formation

$$\kappa(r) = \kappa_0 \left(\frac{\nu}{\nu_0}\right)^\beta$$

Tells us the size of the particles, thus age of star when grains are certain size



Rough Time line

Radiation Program ~~~~~ 2 months

Keplarian addition ~~~~~ 1 week

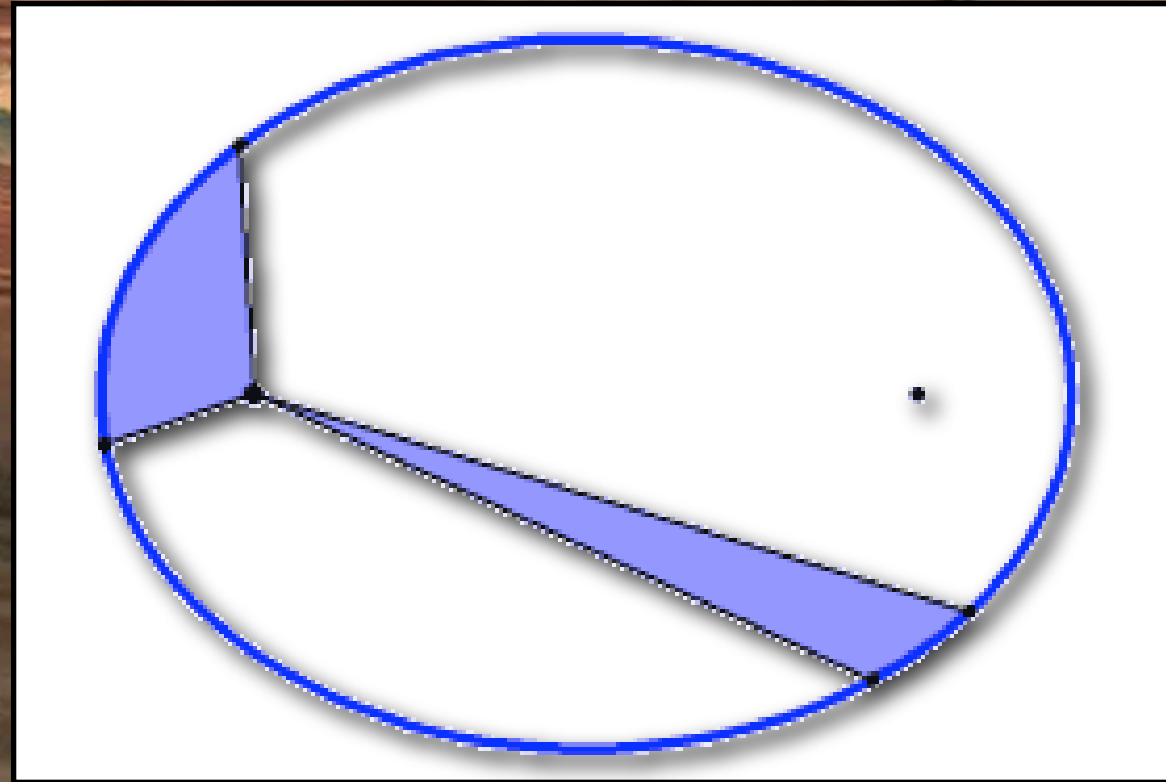
Chi Squared program ~~~~~ 1 month

Pre-main-sequence theory ~~~~ 1 month

$$T^2 = \frac{4\pi^2}{G(M + m)} \cdot a^3$$

Results of Code

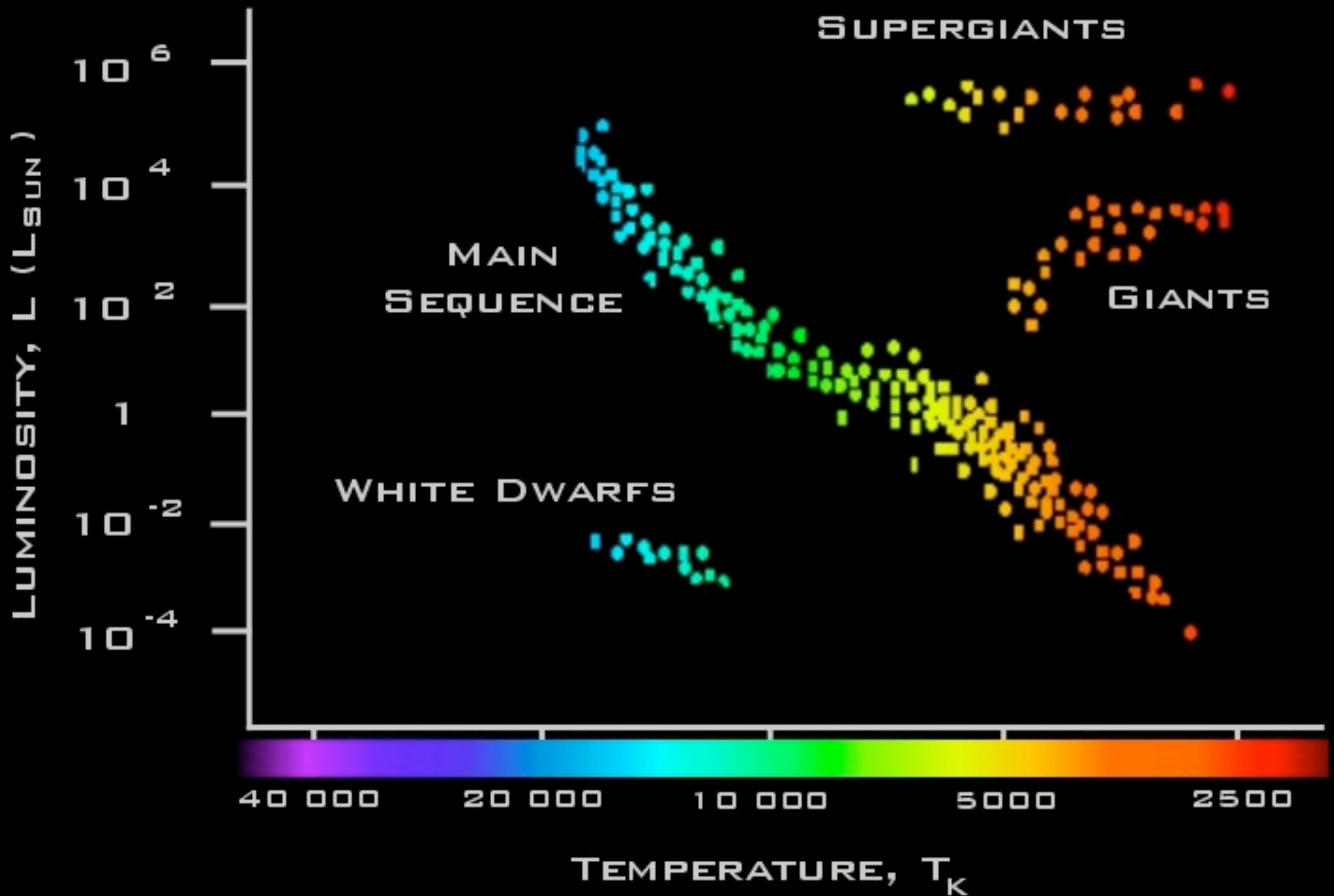
- Mass
- Inclination
- Radius
- Period



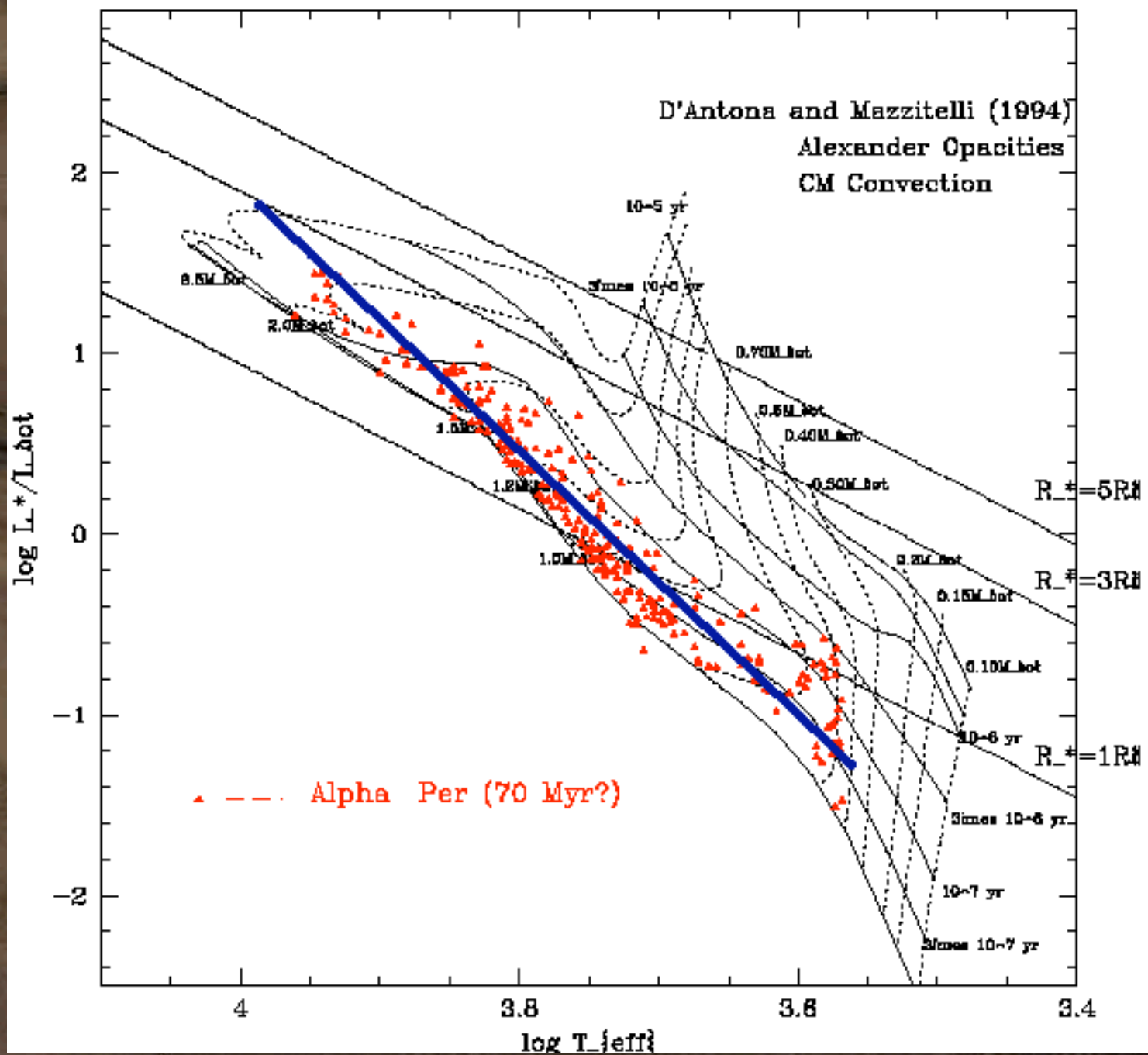
Then can get:

Ages.....

HR- Diagram



Open Cluster Members Using (V-I) SpTy A0-M0



Why do this?



All Pre-Main Sequence theories different

- Equation of State
- Opacity
- Convection Model

When we have the correct PMS theory then we will understand star formation

In Summary

- Yeah Brown Dwarfs!

-programming.....

- Yeah Arecibo

