concluding remarks

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and

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CoRoT-3 / KASC-7 abstract book: word cloud

the space photometry revolution

Definitions and Characteristics of Revolutions:

Dictionary:

- a forcible overthrow of a government or social order in favor of a new system
- a dramatic and wide-ranging change in the way something works or is organized or in people's ideas about it

Vladimir Lenin:

- A revolution is impossible without a revolutionary situation.
- It is impossible to predict the time and progress of revolution. It is governed by its own more or less mysterious laws.

Surely the workings of ESA and NASA qualify as mysterious, at best — in an alternate Universe . . .

Ron Gilliland

the space photometry revolution

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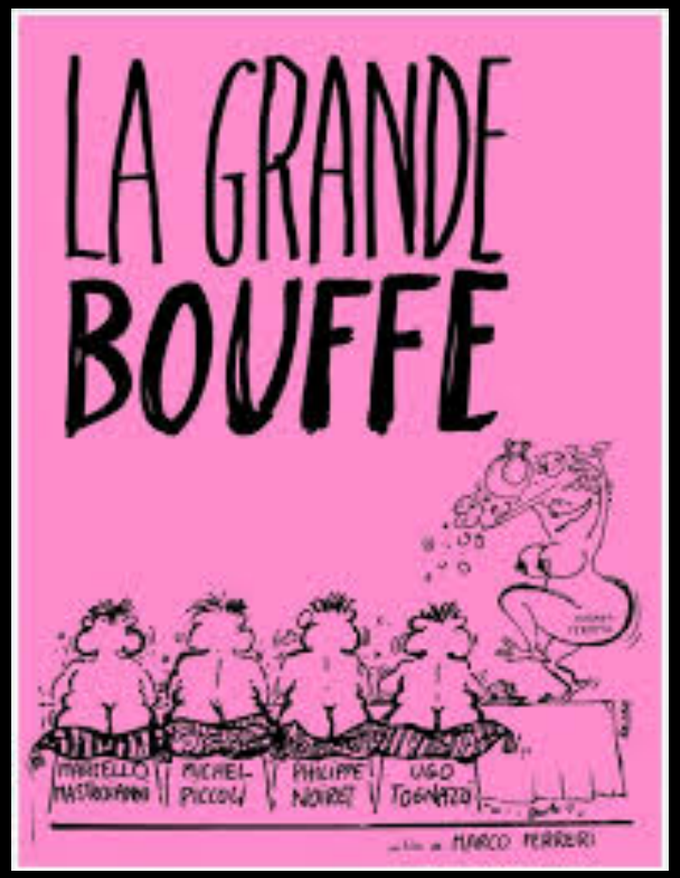
Ron Gilliland

solar-like oscillators:



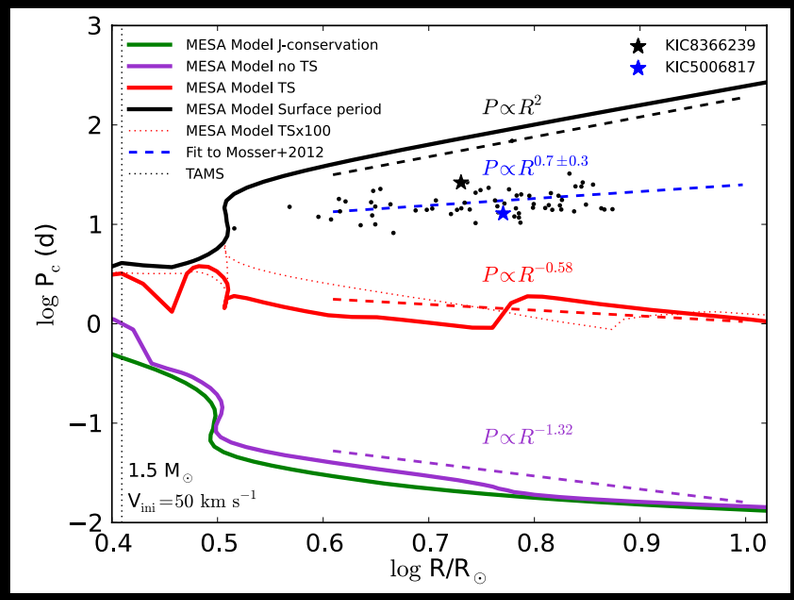
is it over?

solar-like oscillators:

starting to stress-test models

transport of angular momentum

Matteo Cantiello



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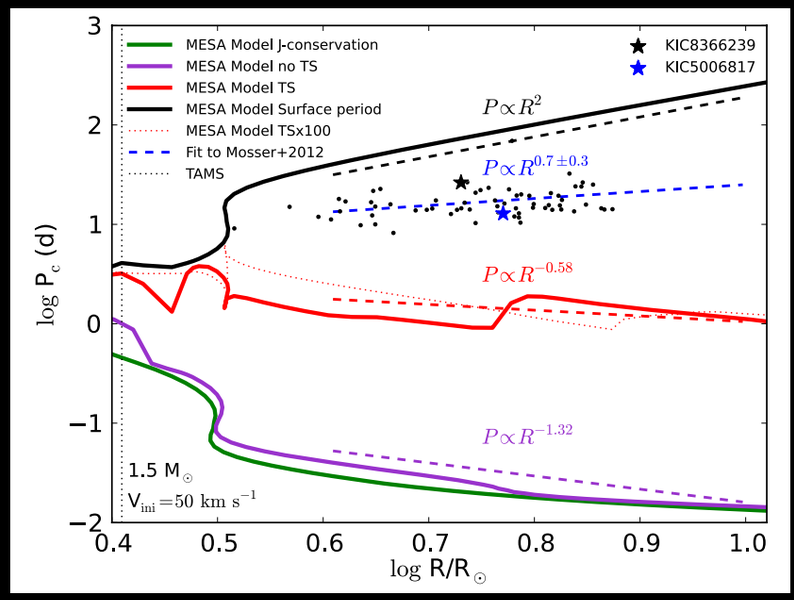
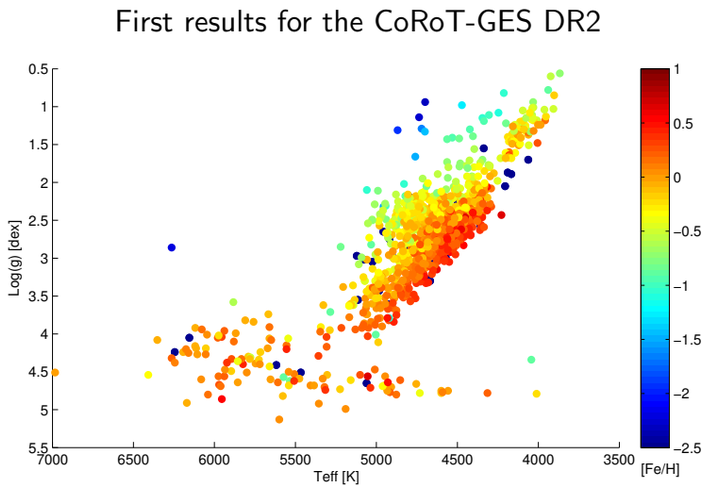


transport of angular momentum

mixing

Sebastien Deheuvels

CoRoT stars in GES-DR2



Marica Valentini

Josefina Montalbán

Marc Pinsonneault

Peter De Cat

Strömgren survey for Asteroseismology and Galactic Archaeology

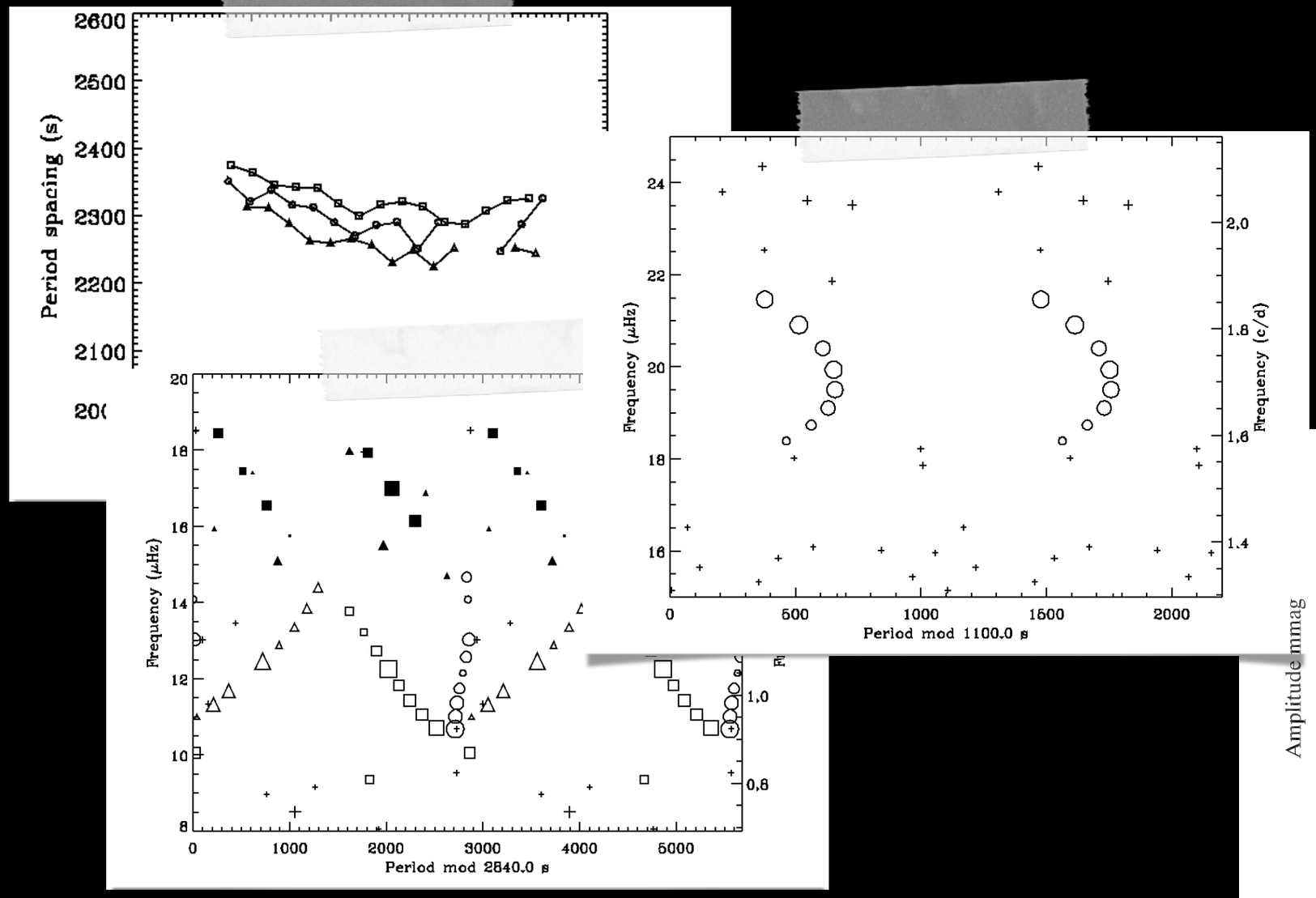
Australian National University

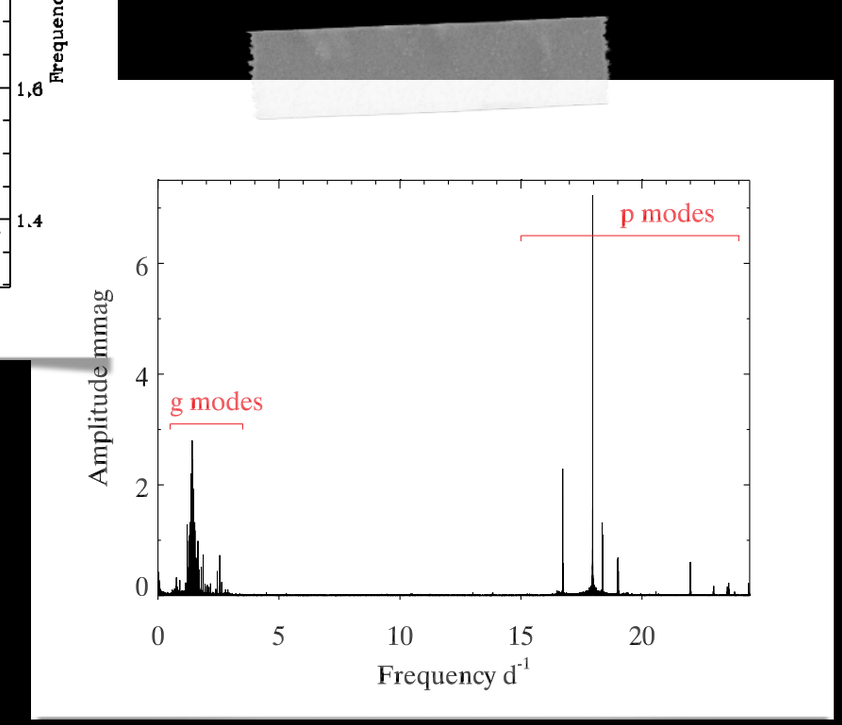
Luca Casagrande

V. Silva Aguirre, D. Stello, D. Huber, A. Serenelli, M.N.Lund, S. Cassisi, A. Dotter, A.P. Milone, S. Hodgkin, A.F. Marino, A. Pietrinferni, M. Asplund, S. Feltzing, C. Flynn, F. Grundahl, P.E. Nissen, R. Schönrich, K.J. Schlesinger, W. Wang

Luca Casagrande

classical pulsators strike back?





Tim Bedding, Don Kurtz

classical pulsators strike back?

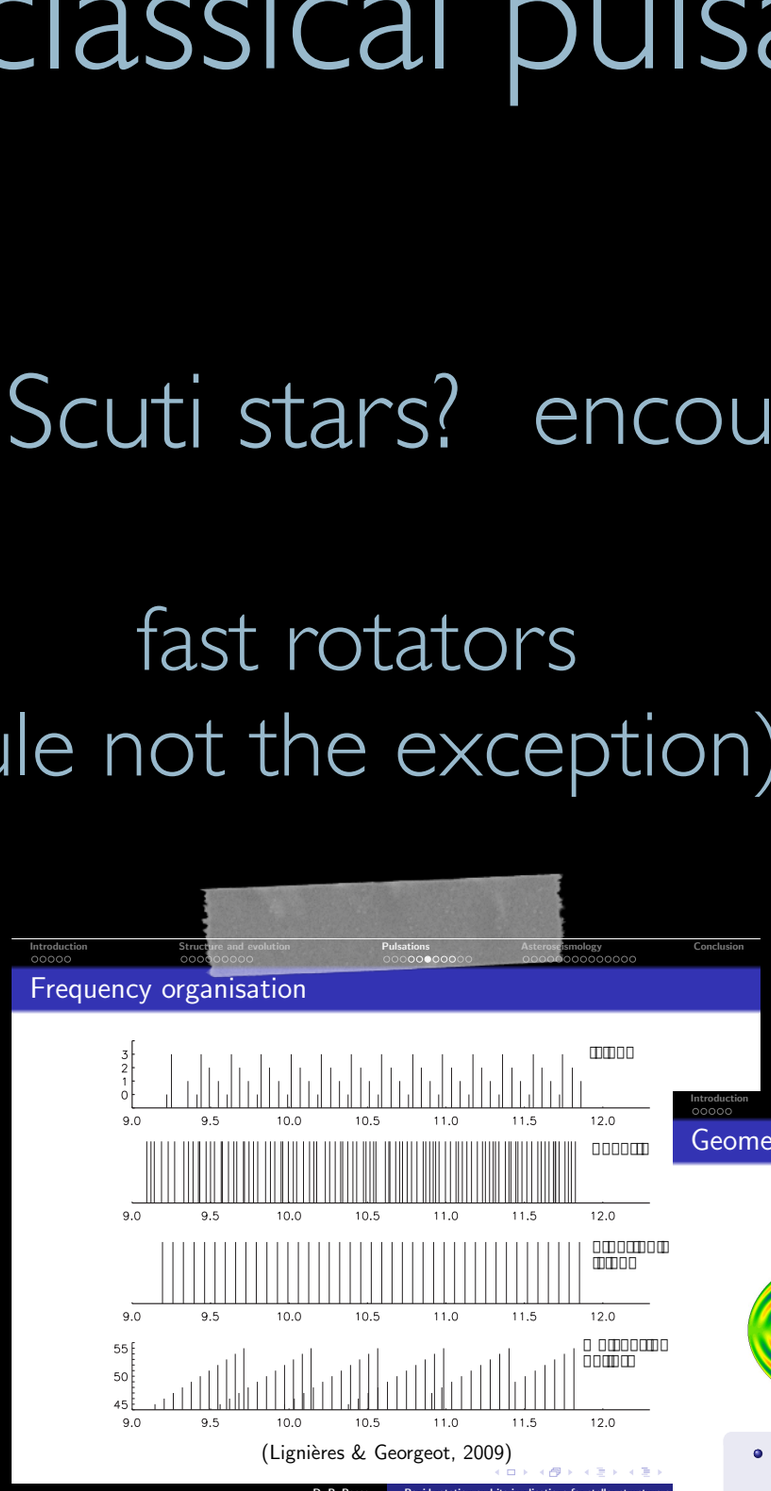
δ Scuti stars? encouraging results Konstanze Zwintz

classical pulsators strike back?

δ Scuti stars? encouraging results Konstanze Zwintz

fast rotators
(rule not the exception)

… more sophisticated
interpretation needed



Daniel Reese

asteroseismology and exoplanets: from revolution to symbiosis

asteroseismology and exoplanets: from revolution to symbiosis

Symbiosis

Interaction between two different organisms living in close physical association

asteroseismology and exoplanets: from revolution to symbiosis

Symbiosis

Interaction between two different organisms living in close physical association

A *Parasitism*

A parasitic relationship is one in which one member of the association benefits while the other is harmed.

asteroseismology and exoplanets: from revolution to symbiosis

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An association between two organisms in which one benefits and the other derives neither benefit nor harm.

asteroseismology and exoplanets: from revolution to symbiosis

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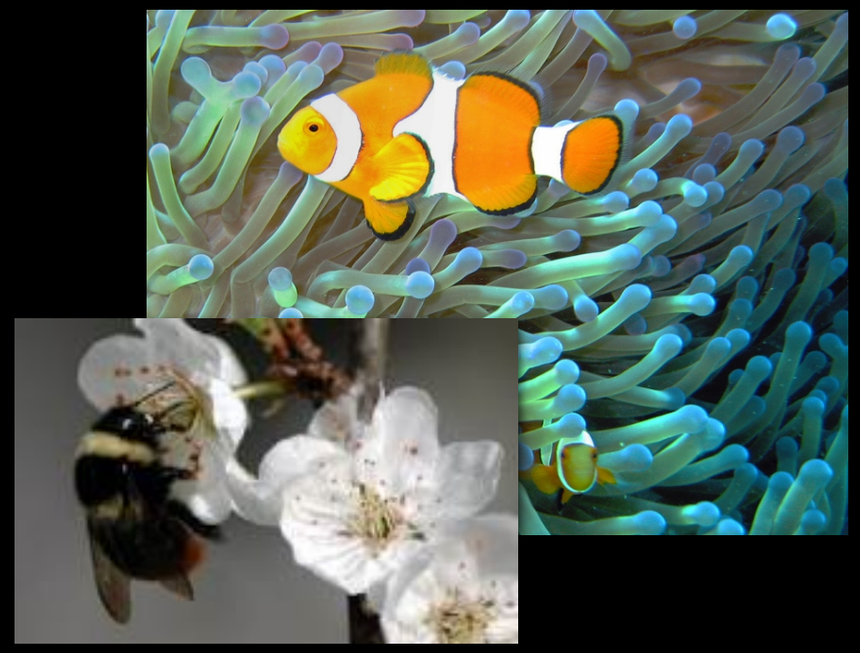
B *Commensalism*

An association between two organisms in which one benefits and the other derives neither benefit nor harm.

C *Mutualism*

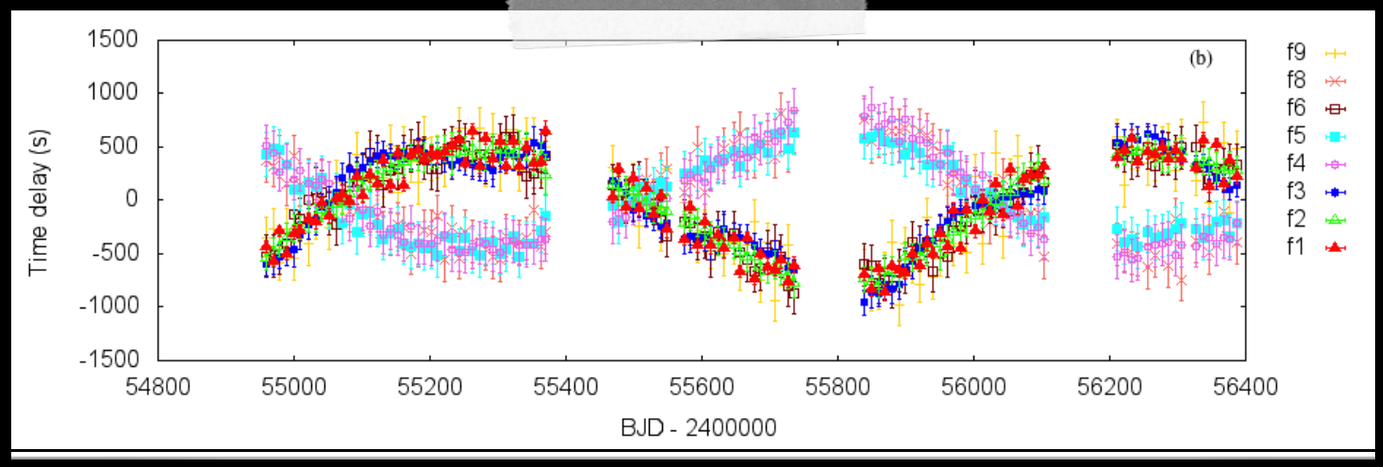
Mutualism is any relationship between individuals of different species where both individuals benefit.



from revolution to symbiosis

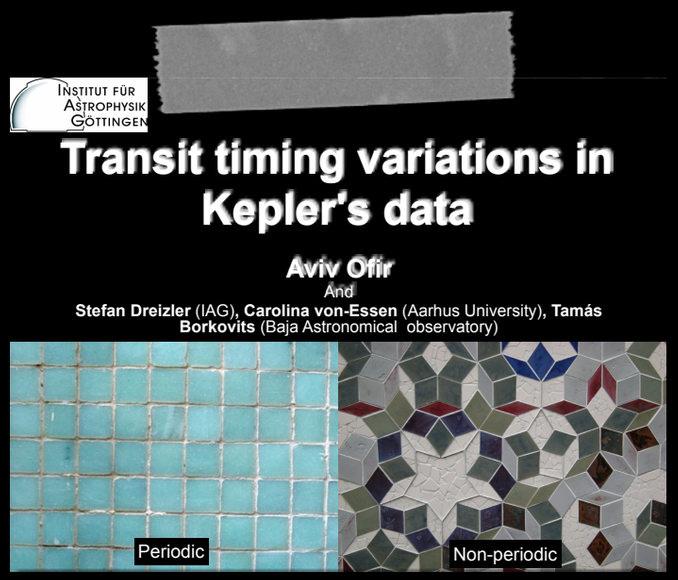
light-time effects

pulsation phase modulation



Simon Murphy PB2

TTVs



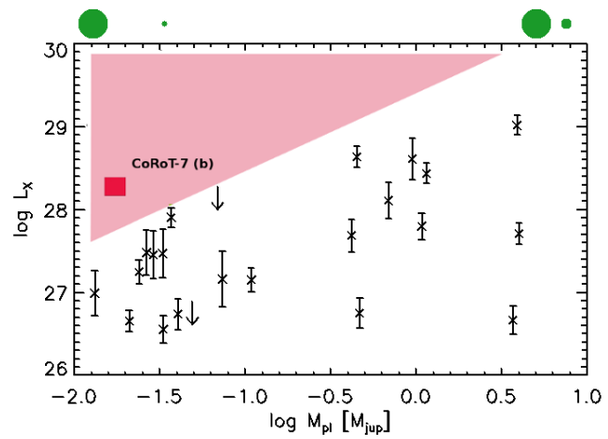
Aviv Ofir

from revolution to symbiosis

large samples: selection effects and biases

populations of exoplanets

Dealing with selection effects



(Poppenhaeger & Schmitt, 2011)

strong selection effects from RV detections!

Katja Poppenhaeger

stellar populations

UNBIASED

in reality, forward modelling from theoretical models or bias correction are often needed, still

Luca Casagrande

from revolution to symbiosis

asteroseismic constraints on the host star

Victor Silva Aguirre's review talk

Summary

- Virtuous circle: seismology and exoplanets
- Characterise ~100 KOIs
- Accurate masses, radii, and ages
- Facilitate studies of planetary formation and evolution
- Future looks bright: K2, TESS, PLATO…

planets

stars

Isabelle Baraffe

Adiabatic interior (fully convective): revisiting the standard picture?

Reduced heat transport in planetary interiors:
(Stevenson & Salpeter 1977; Stevenson 1979; Chabrier & Baraffe 2007)

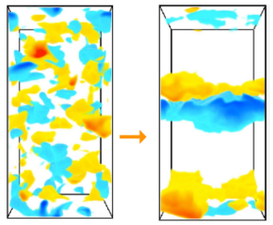
- **Idea:** reduced heat transport in planetary interior due to **molecular weight gradient**

Presence of ∇_μ ---> Stabilizing effect against convection

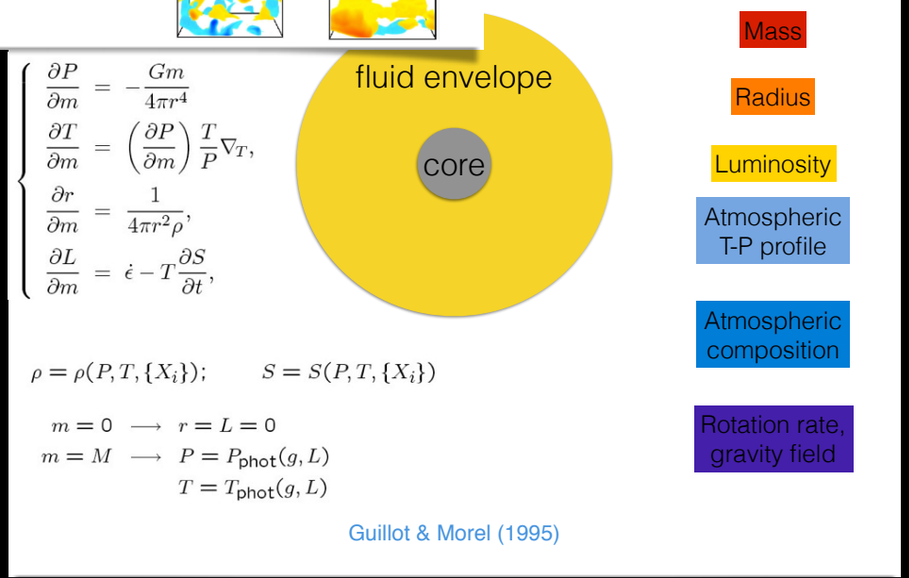
$\nabla_{ad} > \nabla_T + \nabla_\mu \chi_\mu / \chi_T$ (*Ledoux criterion*)

⇒ « layered convection » : system of convective layers + thiny diffusive layers
(double diffusive convection or semiconvection)
Layers formation are **observed** in oceans (Pr = 7) and laboratory experiments

3D numerical simulations:
➡ Layers can form in low-Pr (< 1) double diffusive convection *(Rosenblum et al. 2011)*



olution with CEPAM



$$\begin{cases} \frac{\partial P}{\partial m} = -\frac{Gm}{4\pi r^4} \\ \frac{\partial T}{\partial m} = \left(\frac{\partial P}{\partial m}\right)\frac{T}{P}\nabla_T, \\ \frac{\partial r}{\partial m} = \frac{1}{4\pi r^2 \rho}, \\ \frac{\partial L}{\partial m} = \dot{\epsilon} - T\frac{\partial S}{\partial t}, \end{cases}$$

$\rho = \rho(P, T, \{X_i\}); \qquad S = S(P, T, \{X_i\})$

$m = 0 \longrightarrow r = L = 0$
$m = M \longrightarrow P = P_{\text{phot}}(g, L)$
$T = T_{\text{phot}}(g, L)$

Guillot & Morel (1995)

Mass

Radius

Luminosity

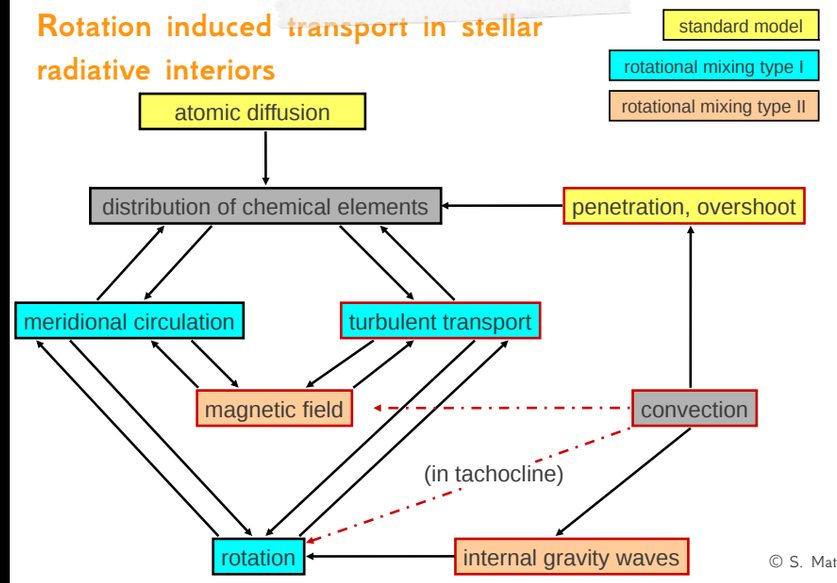
Atmospheric T-P profile

Atmospheric composition

Rotation rate, gravity field

Mathieu Havel

Rotation induced transport in stellar radiative interiors

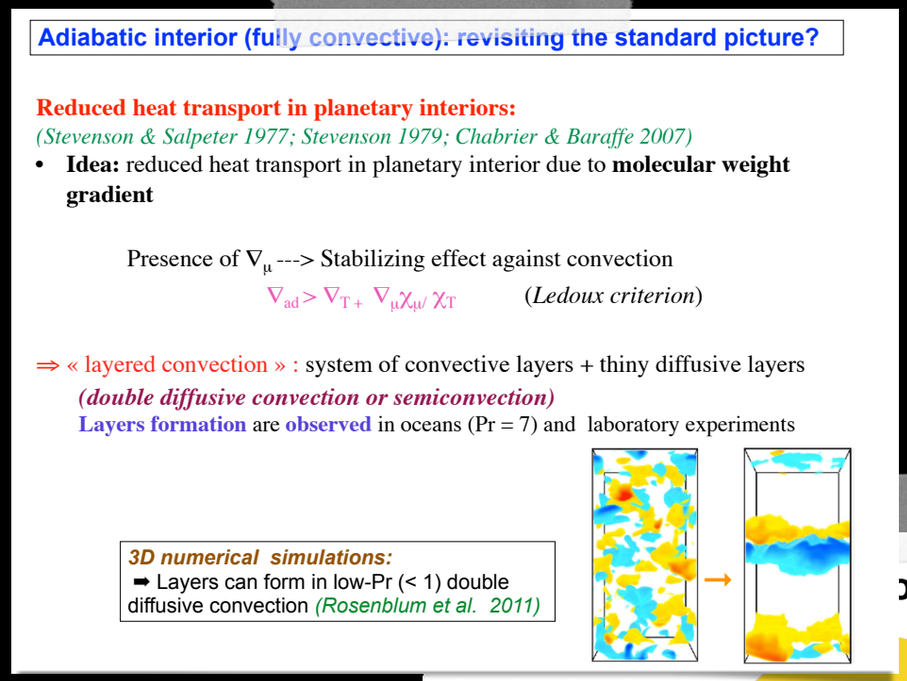


© S. Mathis

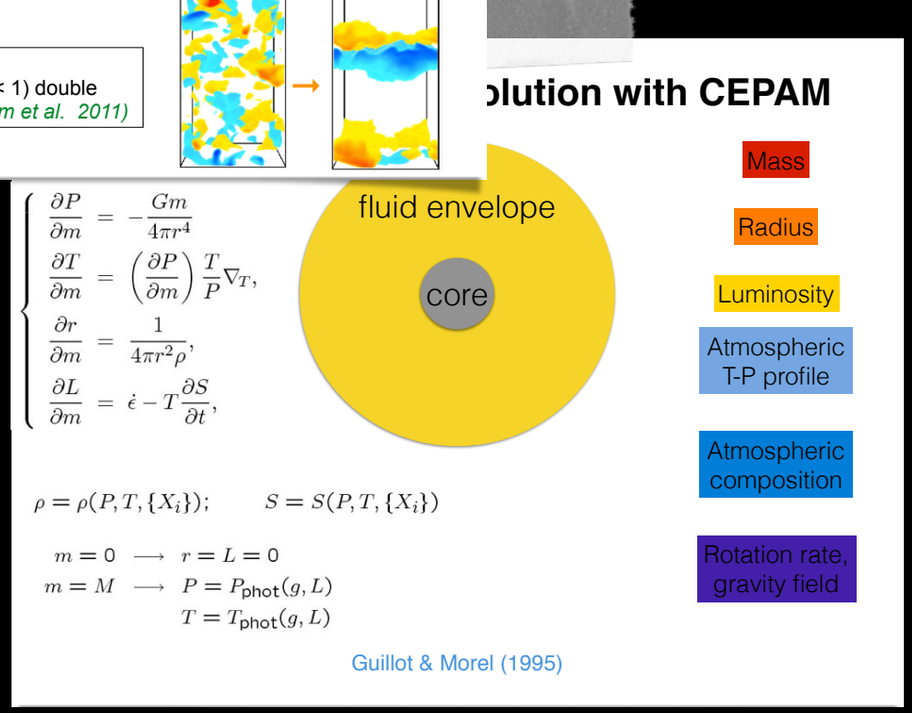
Ana Palacios

planets

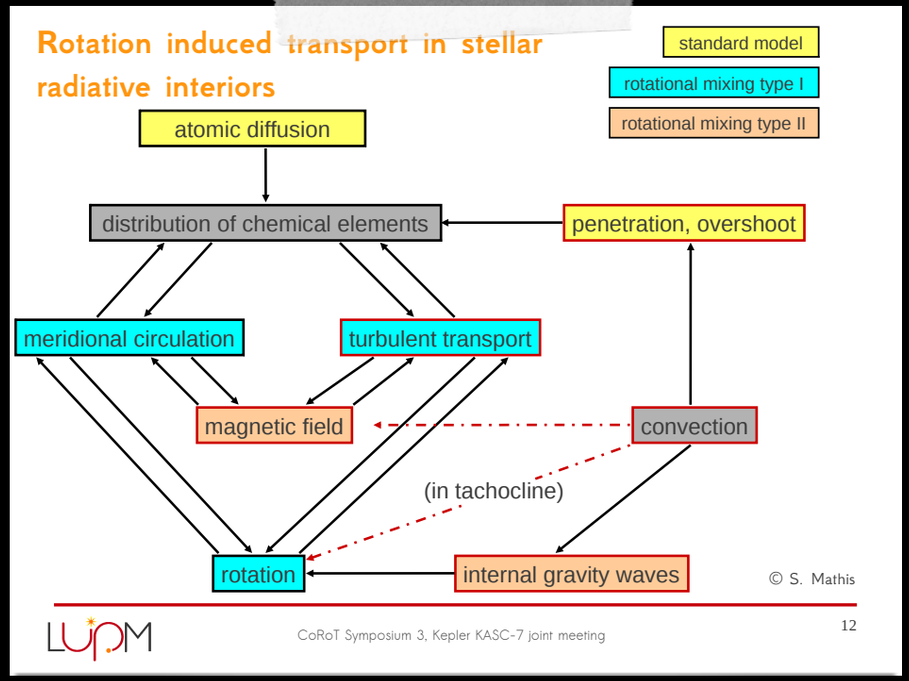
stars



Isabelle Baraffe



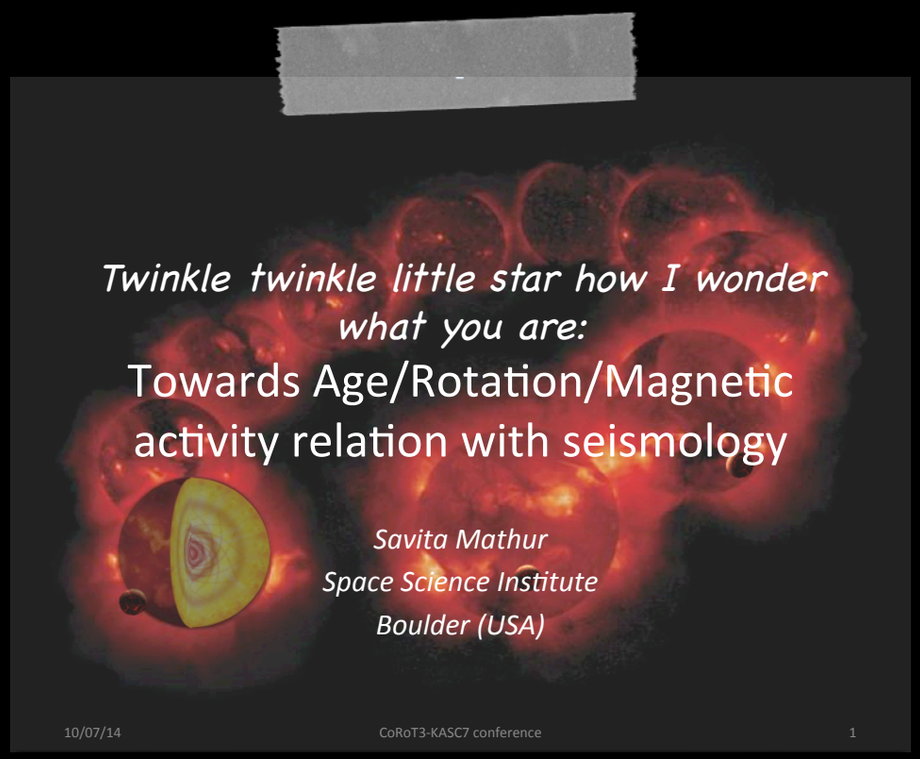
Mathieu Havel



Ana Palacios

+ tidal and magnetic interactions Stephane Mathis

stellar ages accurate to 10%



Savita Mathur

Jennifer Van Saders

"need better stellar physics"
challenge for the next decade(s)

more realistic stellar models

PLATO 2.0 science conference

3-5 December 2014
Catania, Italy

while historically, symbiosis has received less attention than other interactions such as predation or competition, it is increasingly recognised as an important selective force behind evolution.

wikipedia