

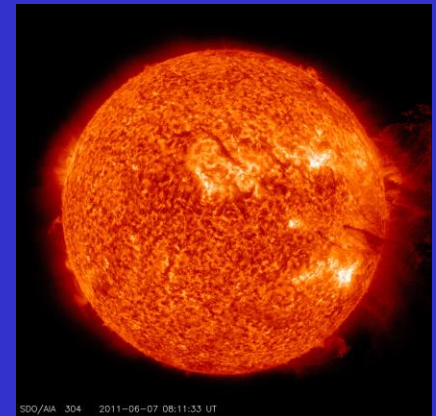
Activity of Red Giants: not dying but rejuvenated



Klaus-Peter Schröder
Universidad de Guanajuato, MEX
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with contributions from:

Vivian Grisell Gómez Trejo (UG, Guanajuato)
Marco Mittag (UH, Hamburger Sternwarte)
Renada Konstantinova-Antova (IoA/Bulg.Ac.Sc., Sofia)



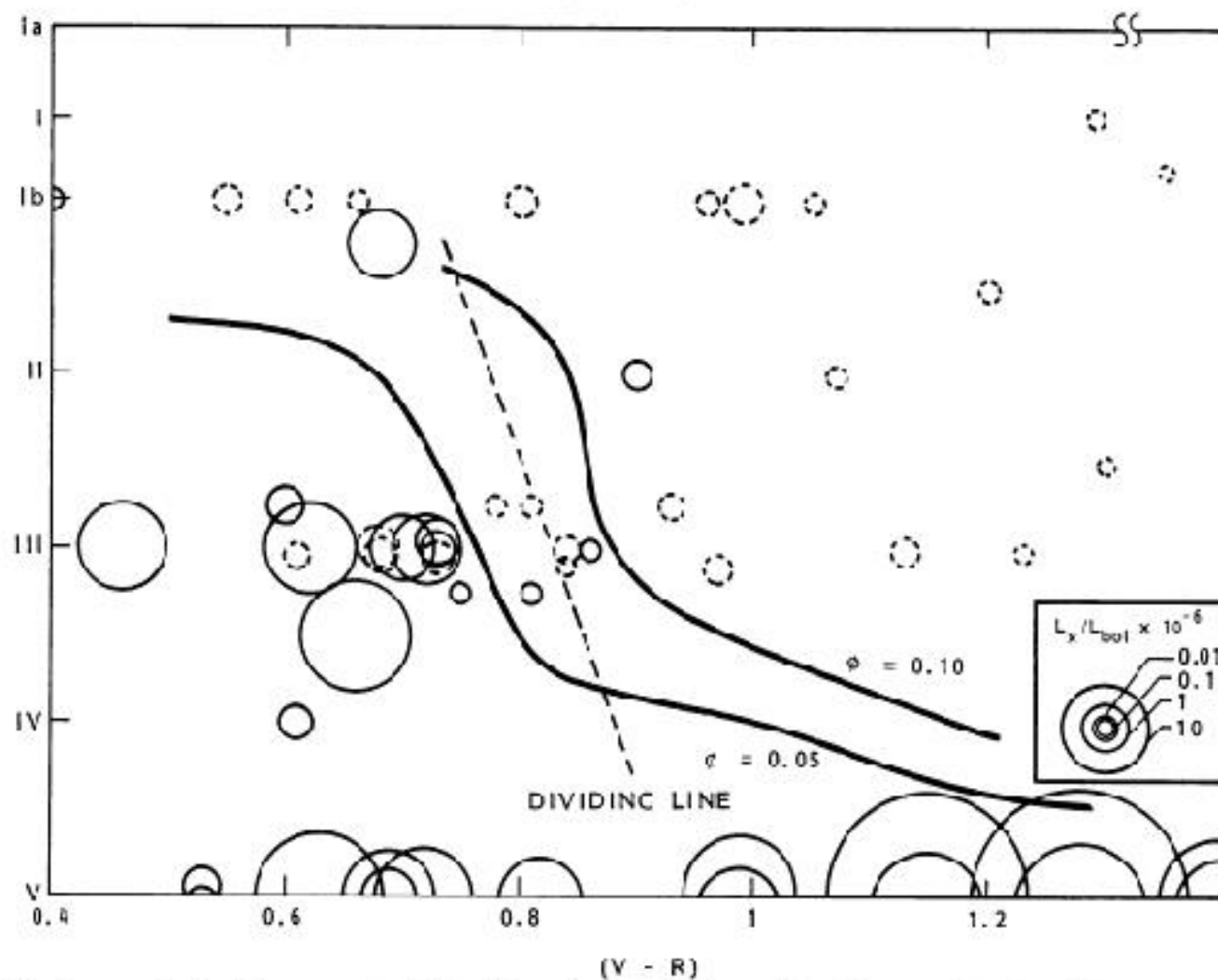


FIG. 2.—An H-R diagram showing the presence (*solid circles*) or absence (*broken circles*) of X-ray emission for all the late-type, single stars observed by Einstein. The sizes of the solid circles are proportional to the ratio of X-ray to bolometric luminosity. Note that the main sequence runs along the bottom of the diagram. The Linsky-Haisch dividing line is shown as a straight, dashed line. Contours of constant ϕ are indicated by the solid lines.

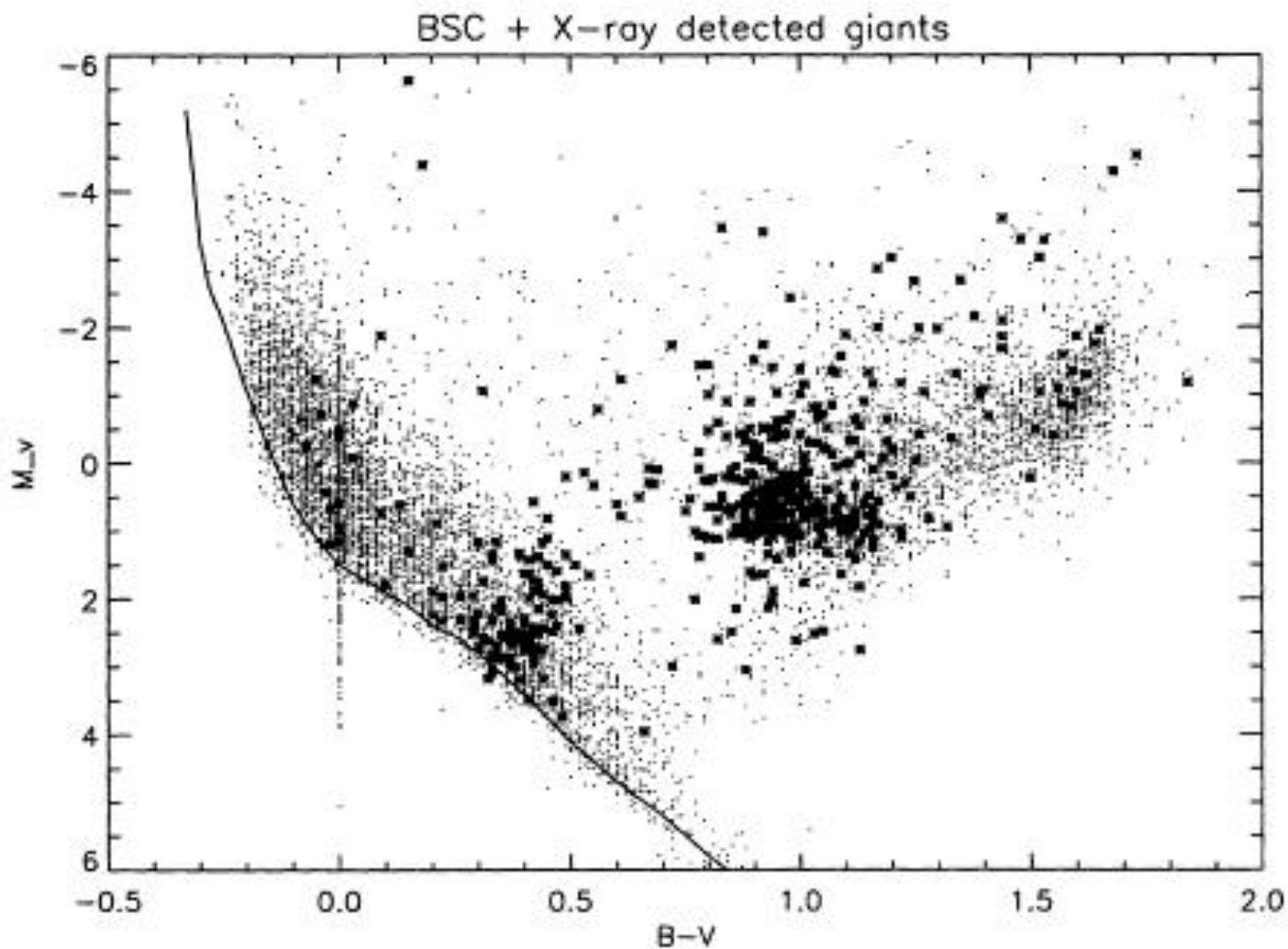
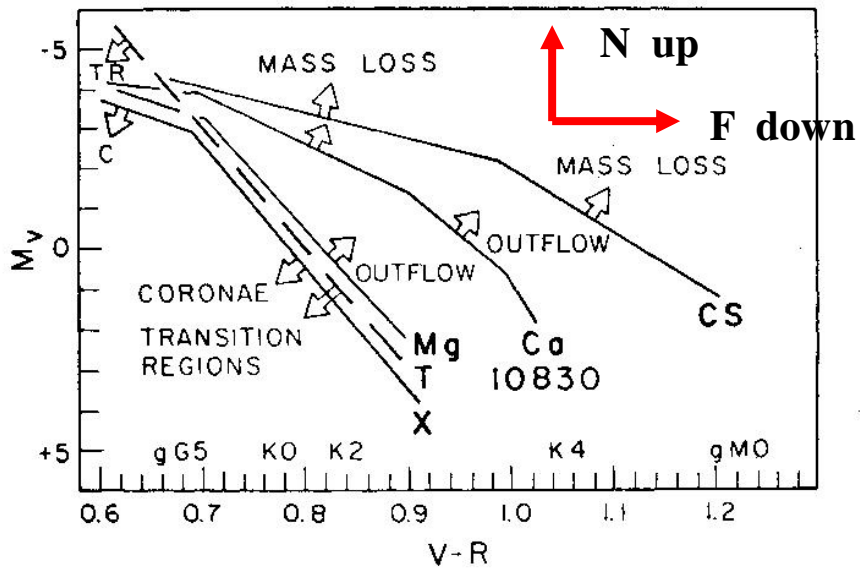


Figure 2. X-ray detected giants of spectral type A to M in the H-R diagram (asterisks). Dots are all Bright-Star-Catalog stars with data from *Hipparcos*. A total of 450 objects was detected in the *ROSAT* all-sky survey. (Diagram supplied by Mathias Hünsch, MPE.)



Dividing lines & chrom. heating

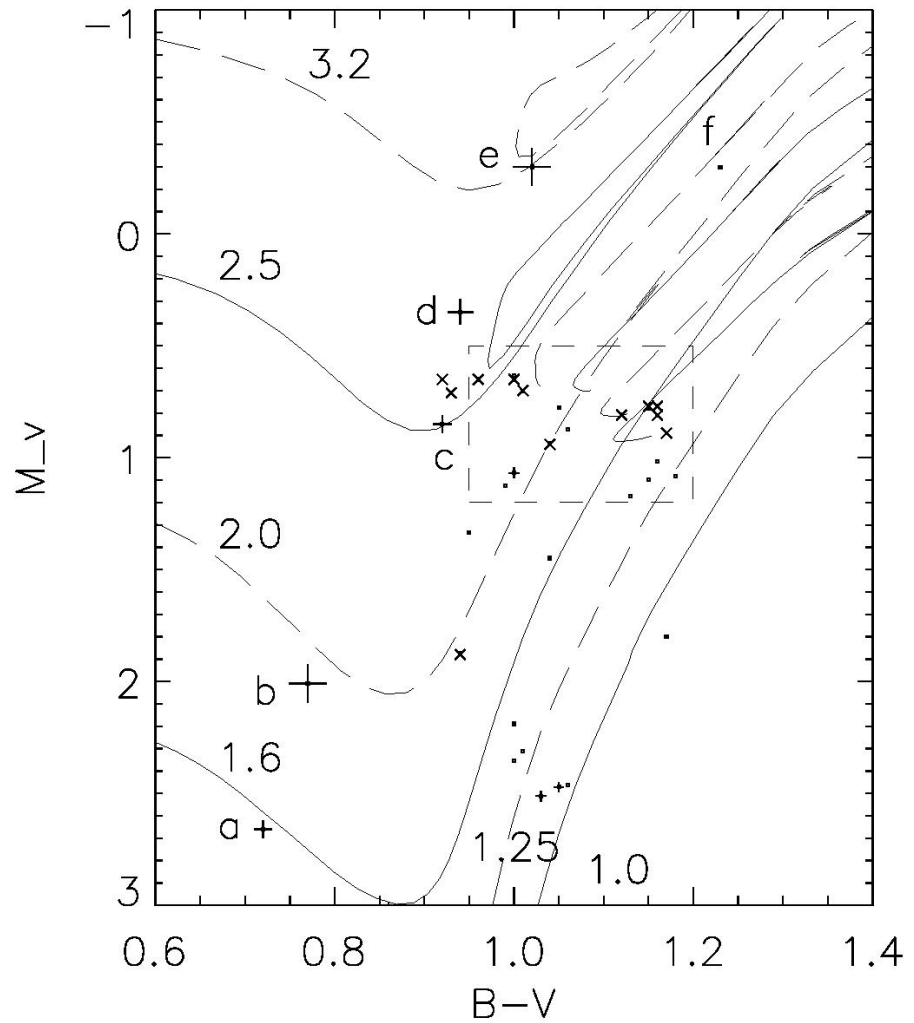
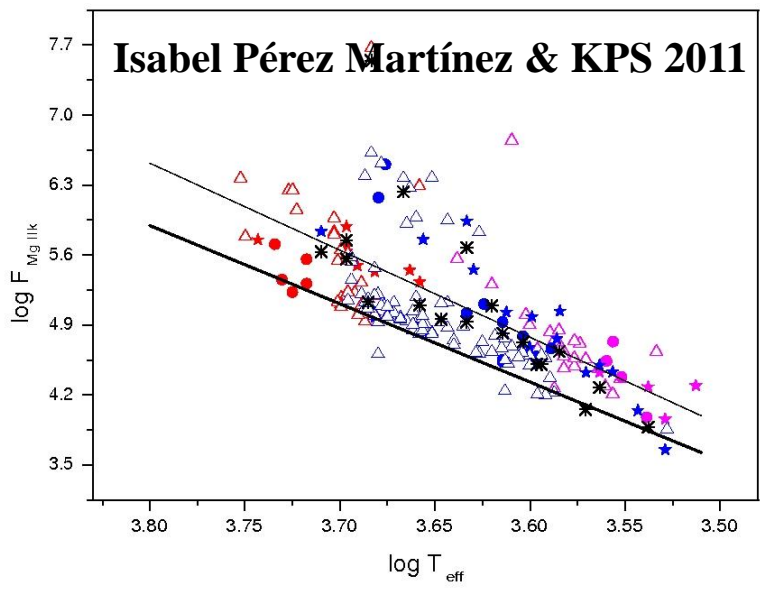


Fig. 1. ROSAT detections of late-type giants and evolutionary tracks. The “K giant clump” region is indicated and stars of interest are labeled, i.e., κ Del (a), 24 UMA (b), η Her (c), ϵ Vir (d), β Cet (e) and α Boo (f), and are discussed in the text. Plus symbols are RASS detections, crosses are for pointed observations, and the symbol sizes indicate X-ray luminosity – dots are RASS non-detections (no pointed observations available, except f).

Schröder et al 1998

Magnetic Field

Observations made by:

*Bernard Lyot 2m telescope
of the
Pic du Midi Observatory
(France) with NARVAL:
a fiber-fed echelle spectro-
polarimeter (Aurière 2003)*

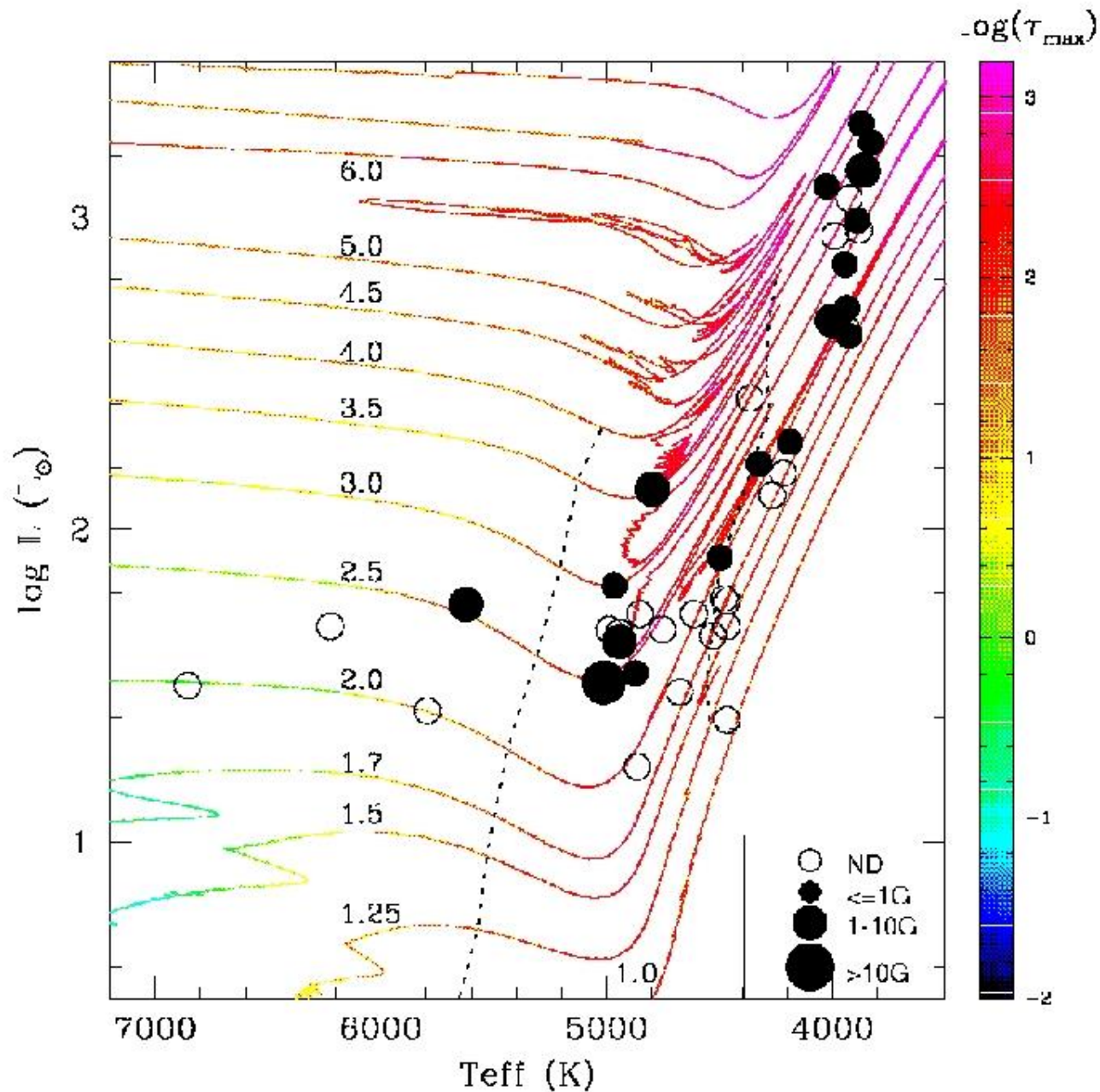


*Spectral range: 370 to 1000 nm & LSD
(Least Square Synthesis)*

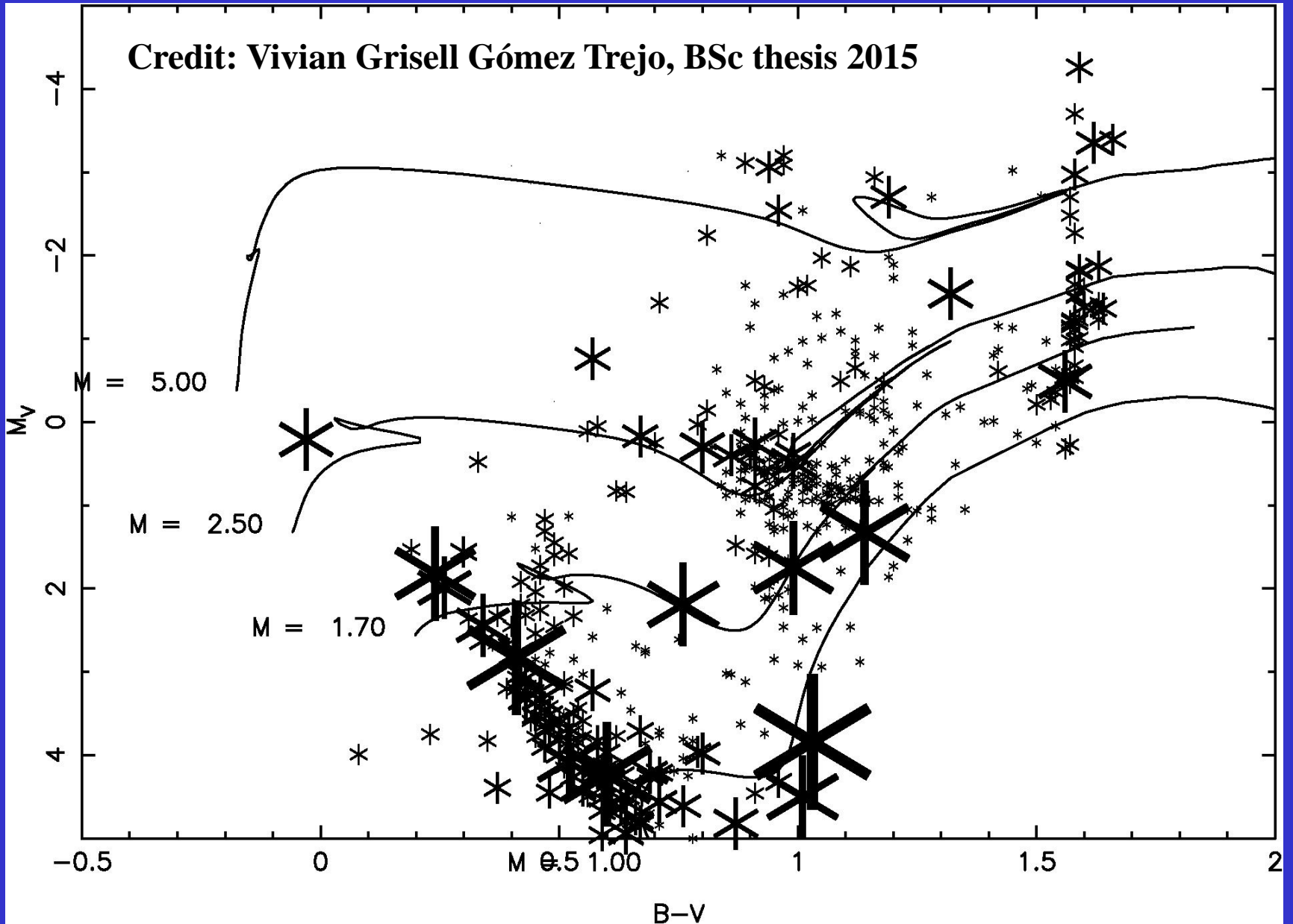
*Team: Michèle Aurière, Renada Konstantinova et al.
(see A&A 574, A90, 2015, and others)*

*By 2015:
magnetic
field
detections
until
up the AGB!*

*=>
giant activity
is much more
normal, than
we thought !*



S-values Duncan et al. 1991 for stars with parallax $> 10 \sigma$



=> Chromospheric heating even increases on RGB/AGB !!

WHY that ??

The answer has been suspected and is now proven by Kepler stellar seismologic data (mode splitting, see P.G. Beck et al. 2012, 2014, Deheuvels et al. 2012, 2014, 2015, and Di Mauro et al. 2015):

*The contracting He core speeds up its rotation, this brings (radial) differential rotation, still Slowing down on KGC, and a dynamo can run.
=> How does that look like?*

Conclusions:

Giant activity is not only normal beyond the Linsky-Haisch coronal-wind deviding line, but it even increases, as S-values show!

Reason: contracting core speads up its rotation

For decades, we have been fooled by decreasing X-ray detections, as that is routed in chromospheric conditions becoming unfavourable to form a corona

=> What kind of dynamo is that? Can TIGRE tell ??