# Stellar Parameters of the Post-AGB Star HD 56126

H. Le Coroller[1], D. Gillet

*Observatoire de Haute-Provence (CNRS), France*

A.B. Fokin

*Institute of Astronomy, Russian Academy of Sciences, Russia*

A. Lèbre

*GRAAL, Université Montpellier II & CNRS, France*

**Abstract.** We discuss the stellar parameters ($M$, $L$, $T_{\text{eff}}$) of a post-AGB star, HD 56126, deduced from observations and non-linear radiative pulsation models. We show that pure radiative pulsation models are in contrast with stellar evolution.

## 1. Stellar parameters of HD 56126

HD 56126 is a typical carbon-rich post-AGB star with a detached dust shell and IR emission (Meixner et al., 1997; Jura et al., 2000). This star is pulsating with a period of $36.8 \pm 0.2$ days, a photometric amplitude around 0.15 mag, and a photospheric velocity variation of about 15 km s$^{-1}$ (Barthès et al., 2000). To reproduce these observational features we have looked for a non-linear solution through several grids of models (Fokin et al., 2001). For $M < 0.7\,M_{\odot}$ and any $L$ and $T_{\text{eff}}$ the photometric amplitude is too large compared to the observations (Fig. 1). We do find a consistent solution with the observations for stellar parameters : $M = 0.8\,M_{\odot}$, $L = 6000 - 7000\,L_{\odot}$, and $T_{\text{eff}} \leq 5850$ K.

## 2. Discussion and future work

We found that HD 56126 could pulsate in the first overtone of a radial mode with the following stellar parameters: $M = 0.8\,M_{\odot}, L = 6000 - 7000\,L_{\odot}$, and $T_{\text{eff}} \leq 5850$ K. Our result seems to be in contradiction with the stellar evolution. Indeed the mass-luminosity relations (e.g. Herwig et al., 1998) point to a luminosity higher than $16\,000\,L_{\odot}$ for a mass of $0.8\,M_{\odot}$. Moreover, low mass stars under $0.7\,M_{\odot}$ are in better agreement with the evolutionary status of HD 56126 which is a metal deficient Pop.II star.
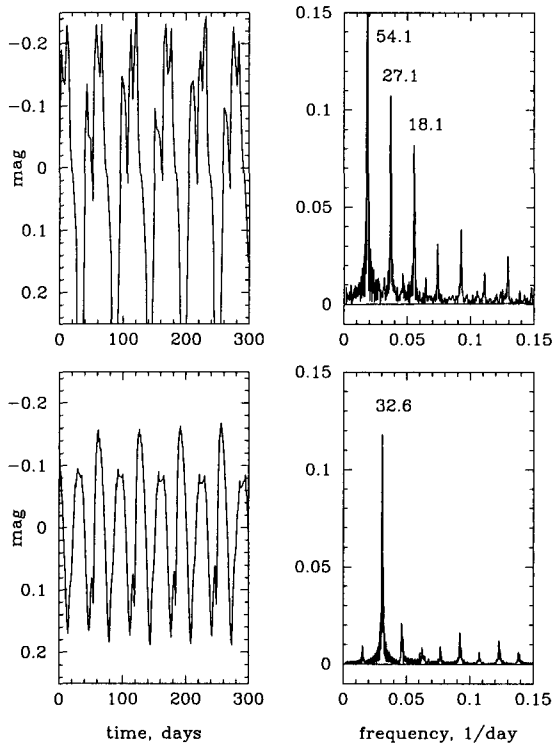
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[1]e-mail: coroller@obs-hp.fr

Figure 1.   Light curves and power spectra for 2 pulsation models: $L = 6000\ L_{\odot}$, $T_{\text{eff}} = 5750$ K, $M = 0.6\ M_{\odot}$ (upper) and $M = 0.8\ M_{\odot}$ (lower).

We used a pulsation model that does not take into account the convection, which could change the pulsational behavior of the model. Moreover, we used a Lagrangian code while models with an adaptative grid code are more suited to resolve accurately the hydrogen ionization zone. Additionally, the dependence of the mass-luminosity relation on the metallicity is still poorly known and it could partly be responsible for the discrepancy between our results and the stellar evolution relation. We will elaborate on these points in future work.

## References

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