Variability in the CoRoT photometry of three hot O-type stars. HD 46223, HD 46150 and HD 46966

R. Blomme, L. Mahy, C. Catala, J. Cuypers, E. Gosset, M. Godart, J. Montalban, P. Ventura, G. Rauw, T. Morel, P. Degroote, C. Aerts, A. Noels, E. Michel, F. Baudin, A. Baglin, M. Auvergne, R. Samadi

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The detection of pulsational frequencies in stellar photometry is required as input for asteroseismological modelling. The second short run (SRa02) of the CoRoT mission has provided photometric data of unprecedented quality and time-coverage for a number of O-type stars. We analyse the CoRoT data corresponding to three hot O-type stars, describing the properties of their light curves and we search for pulsational frequencies, which we then compare to theoretical model predictions. We determine the amplitude spectrum of the data, using the Lomb-Scargle and a multifrequency HMM-like technique. Frequencies are extracted by prewhitening, and their significance is evaluated under the assumption that the light curve is dominated by red noise. We search for harmonics, linear combinations and regular spacings among these frequencies. We use simulations with the same time sampling as the data as a powerful tool to judge the significance of our results. From the theoretical point of view, we use the MAD non-adiabatic pulsation code to determine the expected frequencies of excited modes. A substantial number of frequencies is listed, but none can be convincingly identified as being connected to pulsations. The amplitude spectrum is dominated by red noise. Theoretical modelling shows that all three O-type stars can have excited modes but the relation between the theoretical frequencies and the observed spectrum is not obvious. The dominant red noise component in the hot O-type stars studied here clearly points to a different origin than the pulsations seen in cooler O stars. The physical cause of this red noise is unclear, but we speculate on the possibility of sub-surface convection, granulation, or stellar wind inhomogeneities being responsible.

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