Bayesian Spectral Analysis
of White Dwarf Light Curves

T. Vignaux, R. Arnold, D. Sullivan
Victoria University of Wellington
(richard.arnold@vuw.ac.nz)

Abstract

White Dwarfs are stars near the end of their lives which may pulsate with periods of a few minutes, and which can be observed to brighten and dim as they pulsate.

Observations of white dwarf light curves are characterised by broken time series (where days intervene between nighttime observations). Moreover the pulsation frequencies show appreciable amplitude harmonics (i.e. where frequency f appears so to do frequencies $2f$, $3f$, etc.) as well as frequency coupling (if frequencies f_1 and f_2 are observed, so too is $f_1 + f_2$).

In this paper the Bayesian spectral analysis approach due to Bretthorst (1988) is applied to the analysis of the light curves of white dwarfs. The method yields estimates of the dominant pulsation frequencies which are highly accurate and superior to estimates obtained from classical Fourier techniques. We discuss some of the particular problems which arise in the analysis of white dwarf light curves.

References:

[1] Bretthorst, G.L. 1988. *Bayesian Spectrum Analysis and Parameter Analysis.* New York: Springer-Verlag.