

A MEASUREMENT OF SECULAR EVOLUTION IN THE PRE-WHITE-DWARF STAR PG 1159-035

D.E. Winget, S.O. Kepler¹, E.L. Robinson, and R.E. Nather
Department of Astronomy and McDonald Observatory, USA

D. O'Donoghue
University of Cape Town, South Africa

ABSTRACT. We have analyzed 96 hours of high-speed photometry the pulsating variable star PG 1159-035, obtained from 1979 through 1984. We find that the pulsation period with the largest amplitude, at 516 s, is changing at a rate $dP/dt = (-1.2 \pm 0.1) \times 10^{-11}$ s/s, corresponding to an evolutionary timescale of $\tau \sim (1.4 \pm 0.1) \times 10^6$ yrs. This period change is consistent with theoretical descriptions of a gravitationally contracting pre-white-dwarf object undergoing nonradial g-mode pulsations.

The analysis of the light curve is materially complicated by the presence of at least seven additional periodicities, ranging from 350 s to 842 s, and by the inevitable presence of 24 hour aliases for all of them. We describe in detail the methods used to measure dP/dt and to eliminate all possible alternative values for it.

D.O'Donoghue: Department of Astronomy, University of Cape Town, Rondebosch 7700, Cape Town, South Africa.

S.O. Kepler, R.E. Nather, E.L. Robinson, and D.E. Winget: Department of Astronomy and McDonald Observatory, University of Texas, Austin TX 78712 USA.

1. On leave of absence from the Instituto de Física da Universidade Federal do Rio Grande do Sul, and fellow of the Conselho Nacional de Desenvolvimento Científico e Tecnológico, Brasil.