

Some well-known and some less well-known difficulties in Fourier frequency analysis of head-engine pulsators

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Some basic limitations of Fourier techniques



Ed Nather, Founder of the
Whole Earth Telescope

„If it goes without saying...

...say it twice“

If we observe stars to an order of magnitude better precision, we must suspect to find behaviour an order of magnitude more complicated

We can only develop methods applying to the stars as we know them now

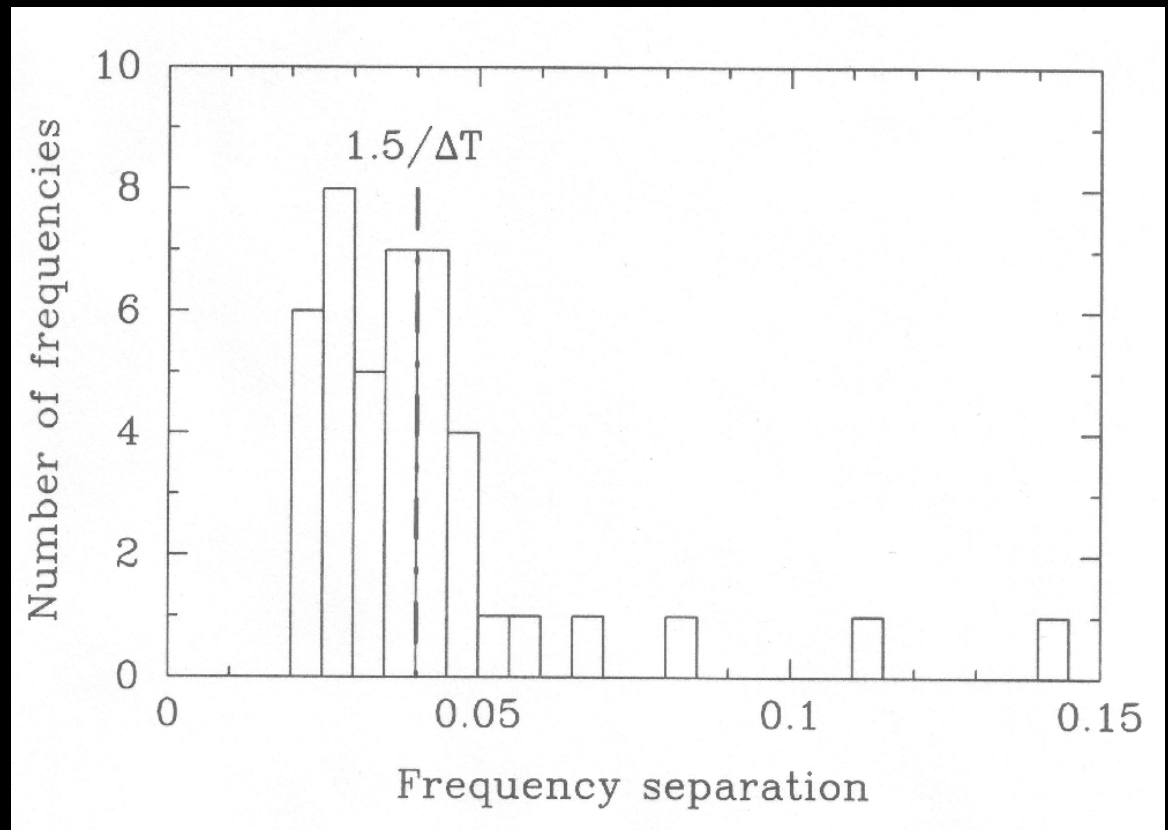
Some basic limitations of Fourier techniques

Aliasing

Nyquist frequency [$\sim 1/(2\Delta t)$]

Length of the data set [$\sim 2/T$]

Temporal resolution of the data set $\sim [1.5/T]$

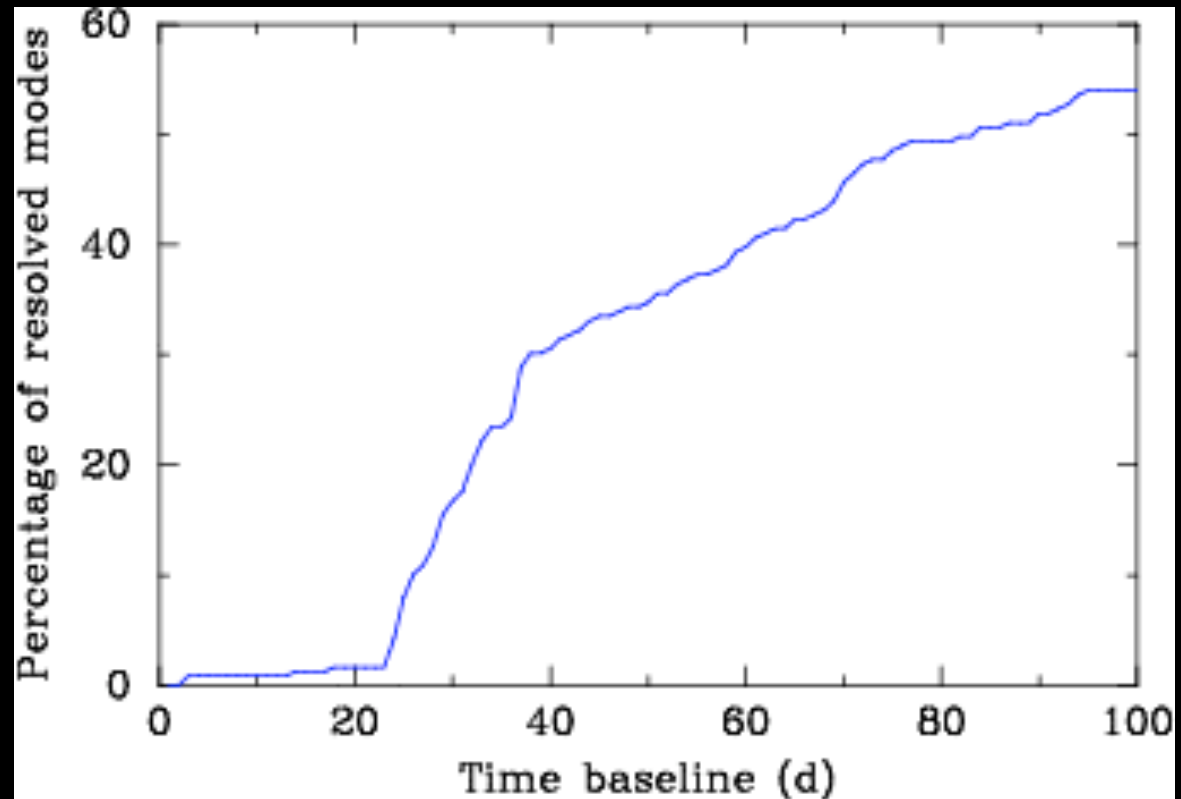


Frequency resolution problems to be expected in space photometry

Close mode frequencies

Amplitude and frequency variations

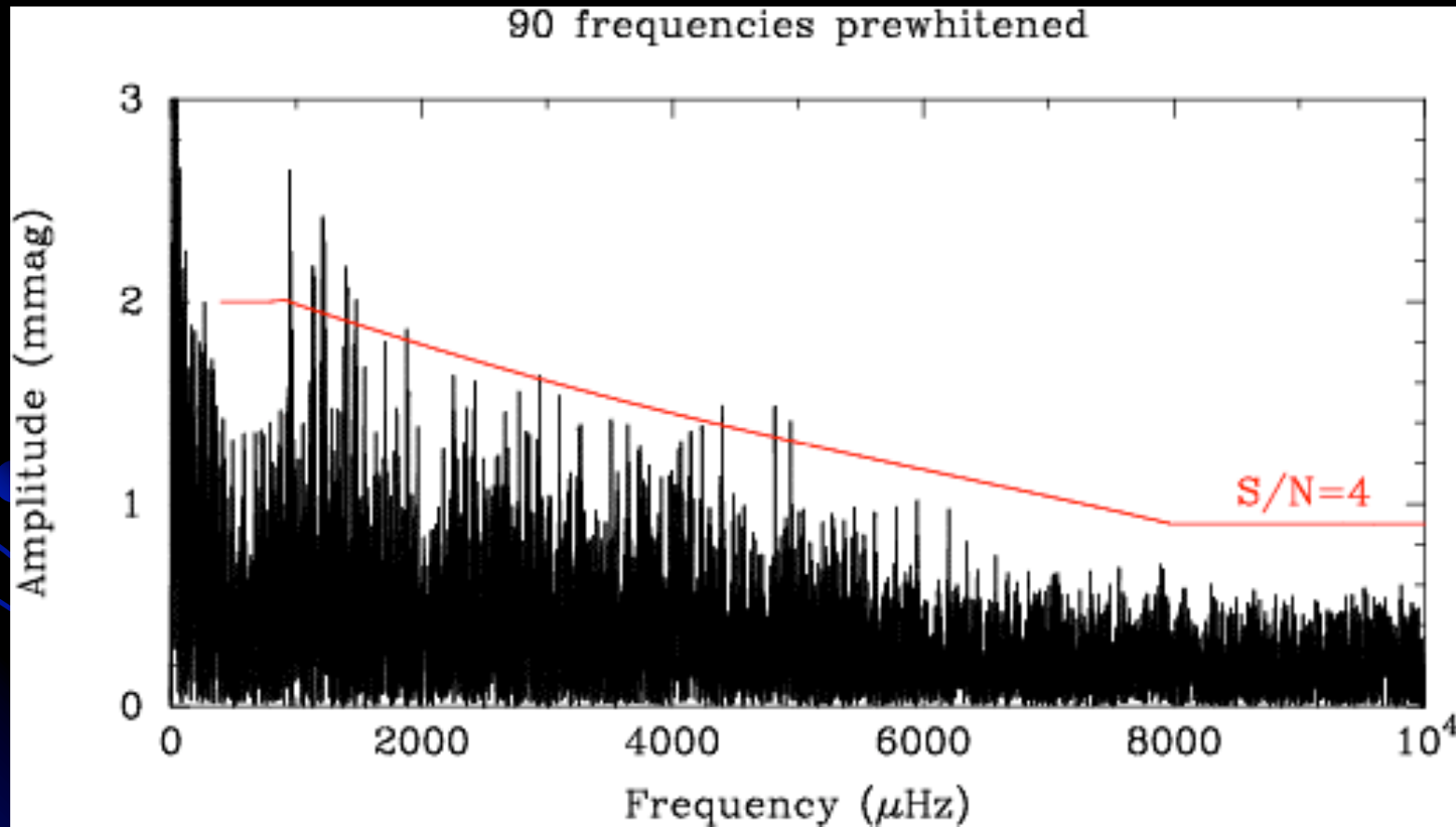
Evolutionary period changes, companions etc.



(Handler 2004)

Noise that is actually signal

Amplitude spectrum of a pulsating white dwarf star



Where do we set our detection limit???

Combination frequencies

Need to be identified and assigned to the correct set of „parents“

Higher-order combinations can become quite nasty!

Very low
mass star?

Difference
combination
frequency!

$$f_A + f_B - f_C!$$

