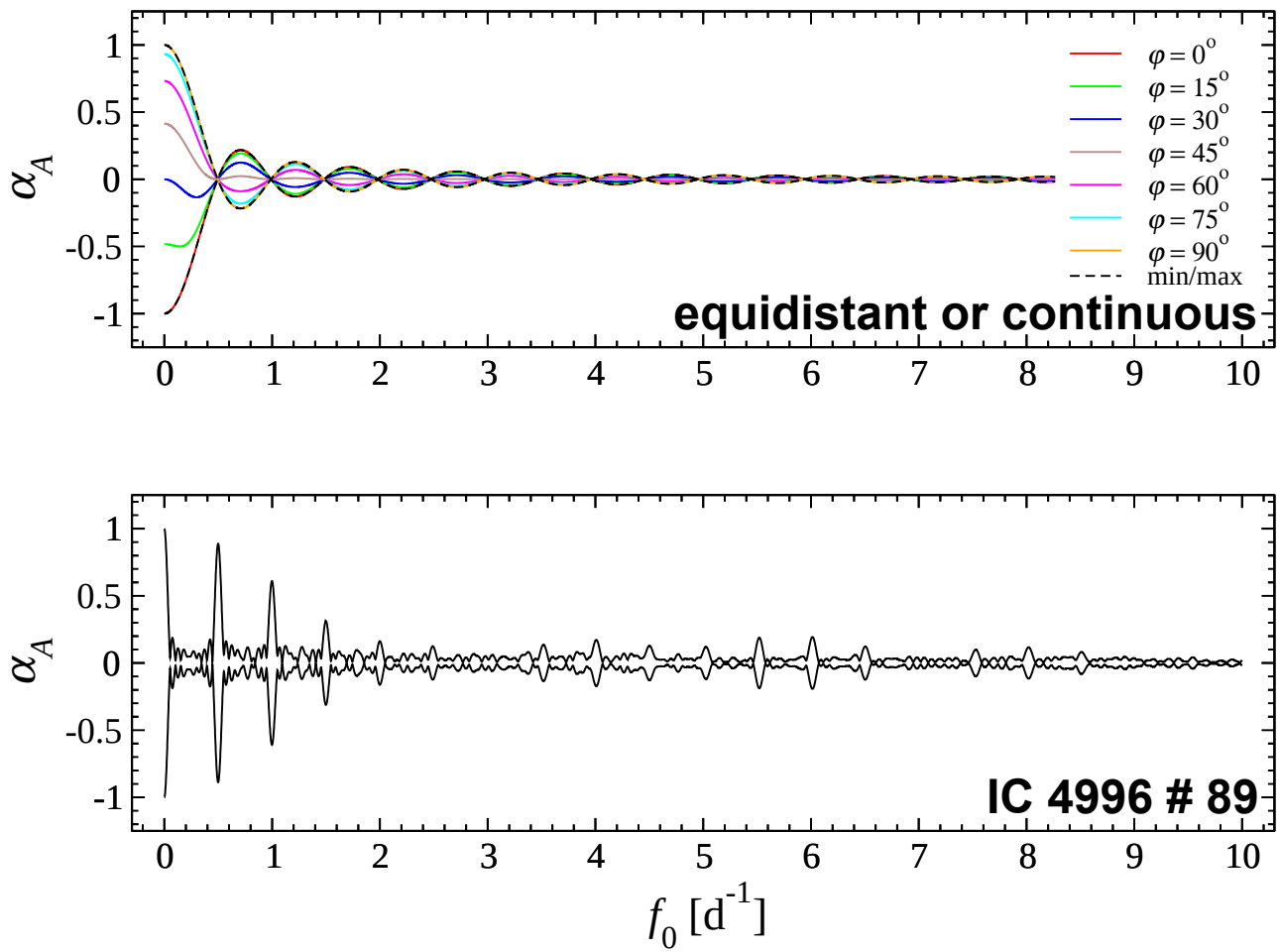
SigSpec

- **exact computation of false-alarm probability**
  - analytical solution for PDF
  - includes frequency- and phase-dependence
- **affordable time consumption**
  - faster than multi-period least-squares fitting
- **reciprocal false-alarm probability**
  - logarithmic ⇨ **$\mathrm{sig}(A) := -\lg \Phi_{FA}(A)$**
  - number of attempts to obtain one case of false alarm
  - **Example:** $\mathrm{sig}(A) = 5$ ⇨ $\Phi_{FA}(A) = 10^{-5}$
    ⇨ one misinterpretation in 100000 spectra
  - S/N = 4 corresponds to $\mathrm{sig}(A) \approx 5.45$

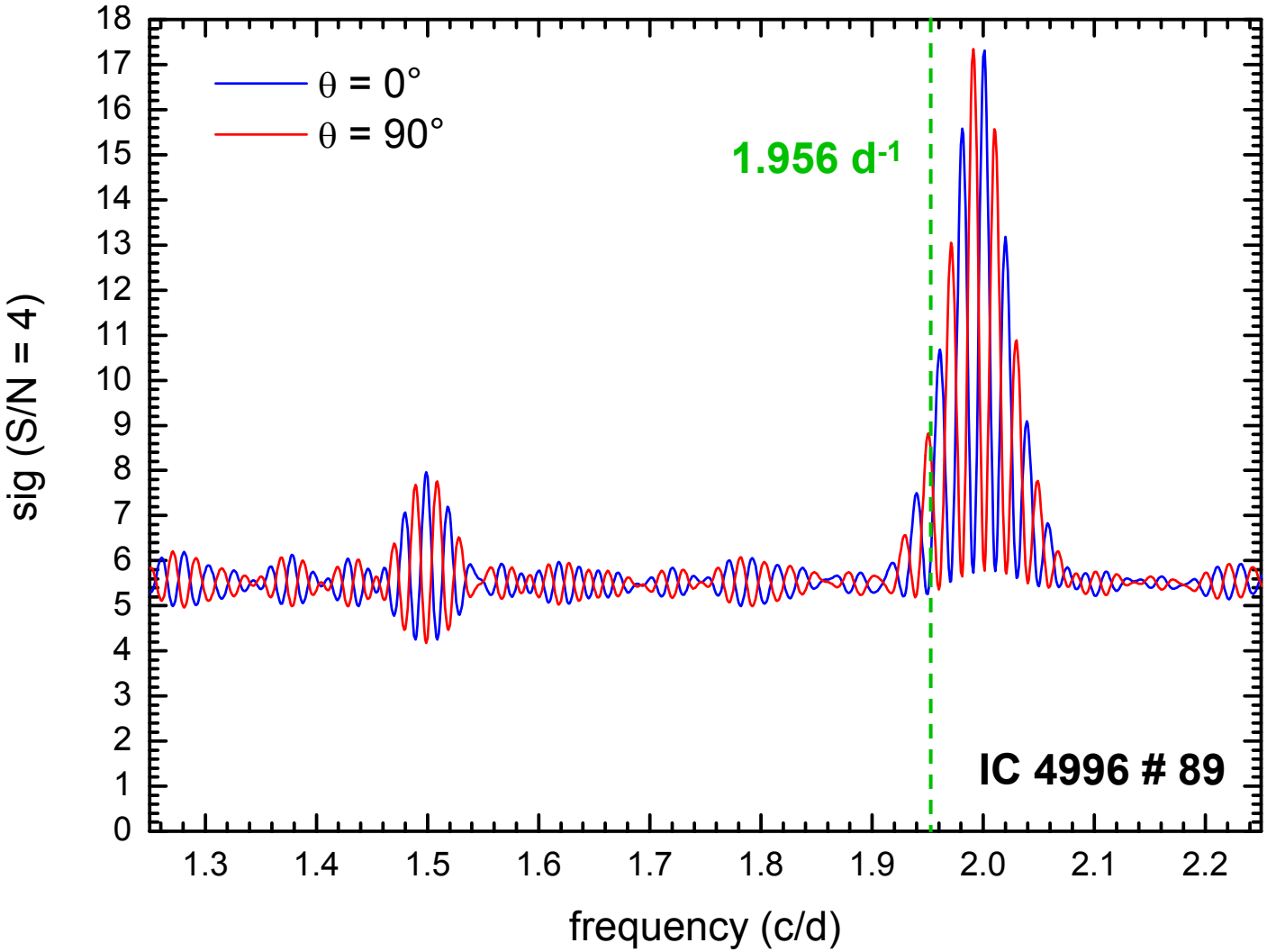
Piet Reegen
University of Vienna, Austria

Accuracy of Amplitudes



- **SIGSPEC**
  - problems with DFT
  - dependencies of significance
  - comparison of frequency accuracy
  - examples
- **COMBINE**
  - straight-forward approach
  - examination of aliasing
  - subset averaging

Dependencies



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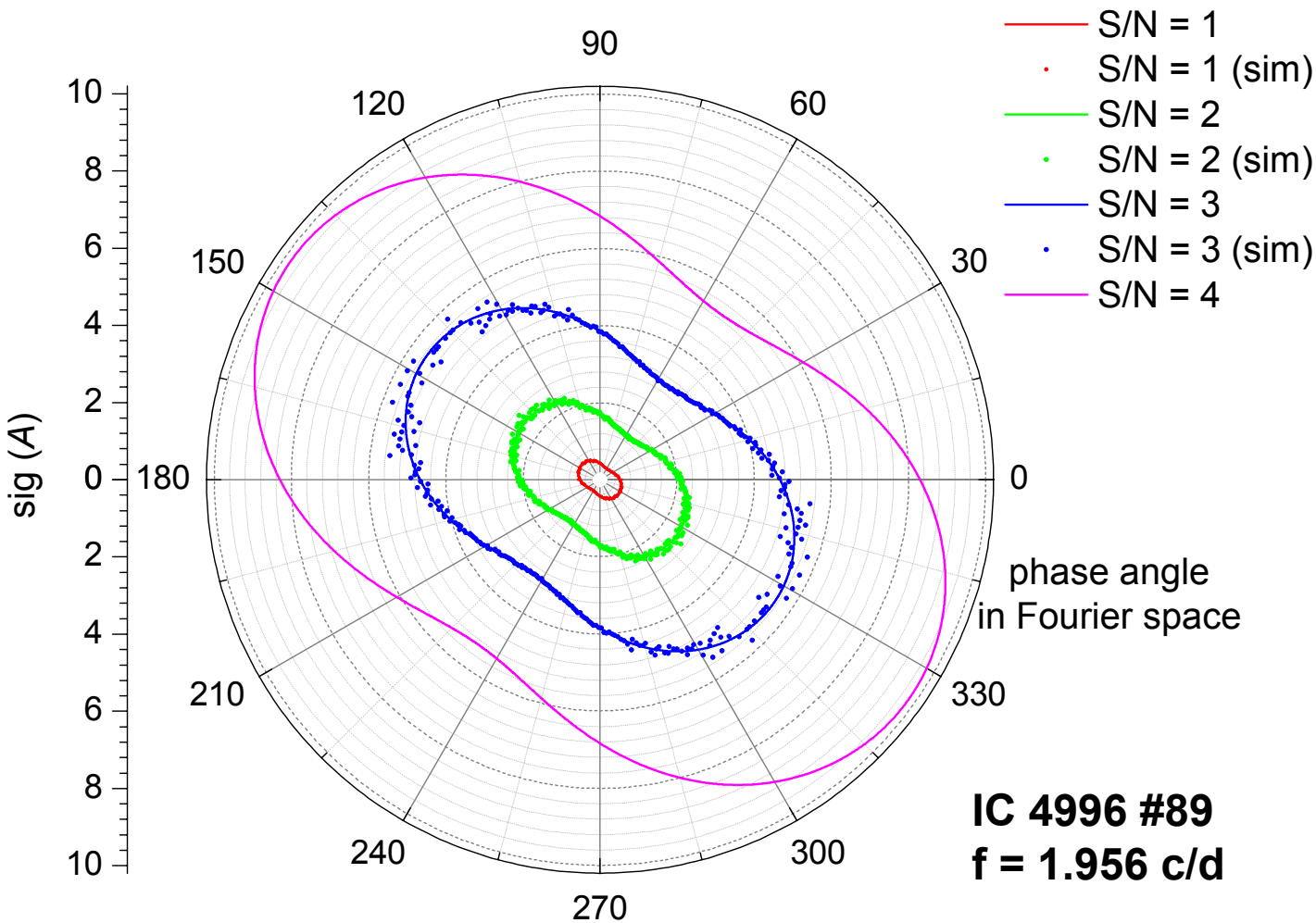

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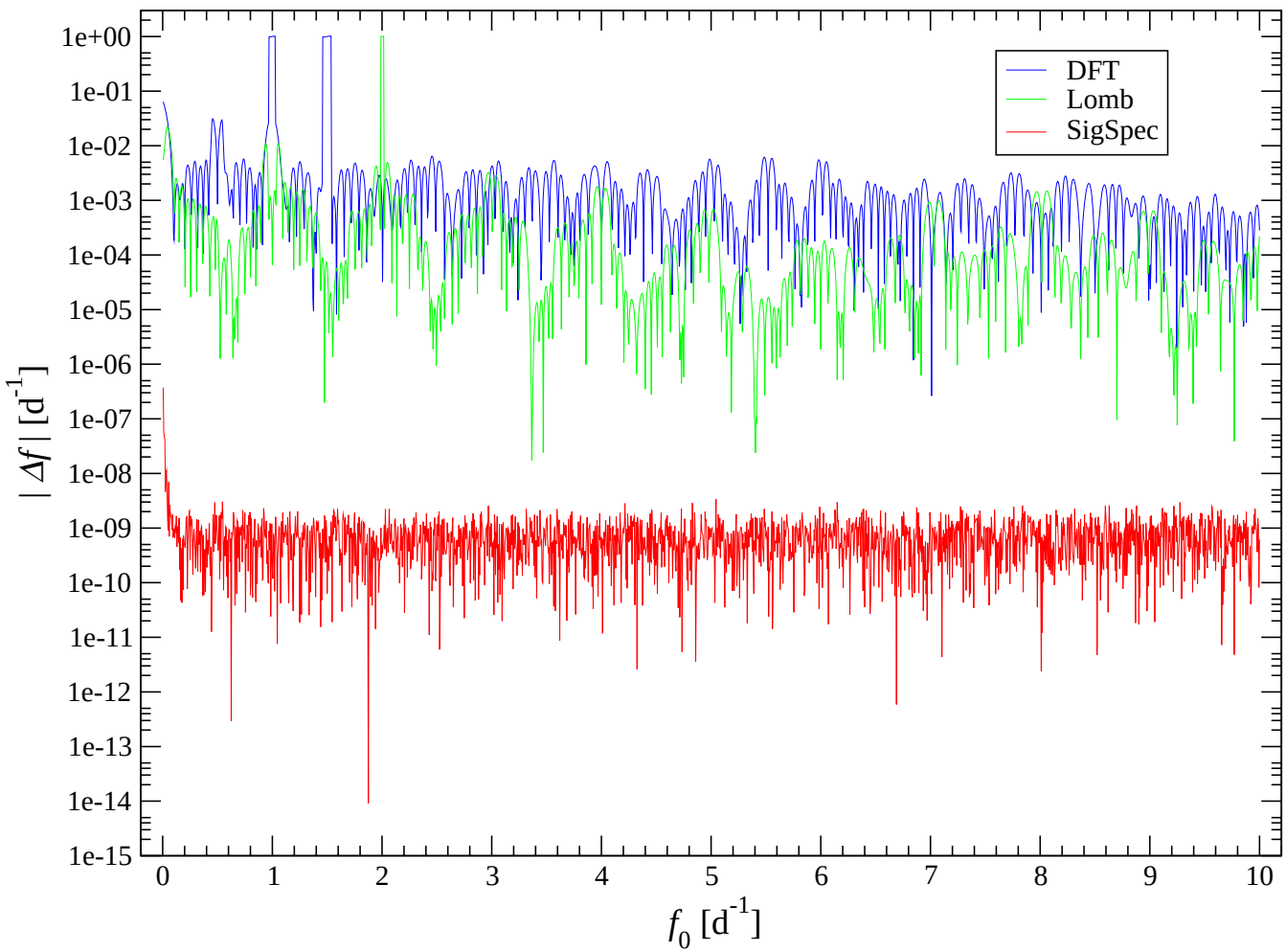
Accuracy of Frequencies



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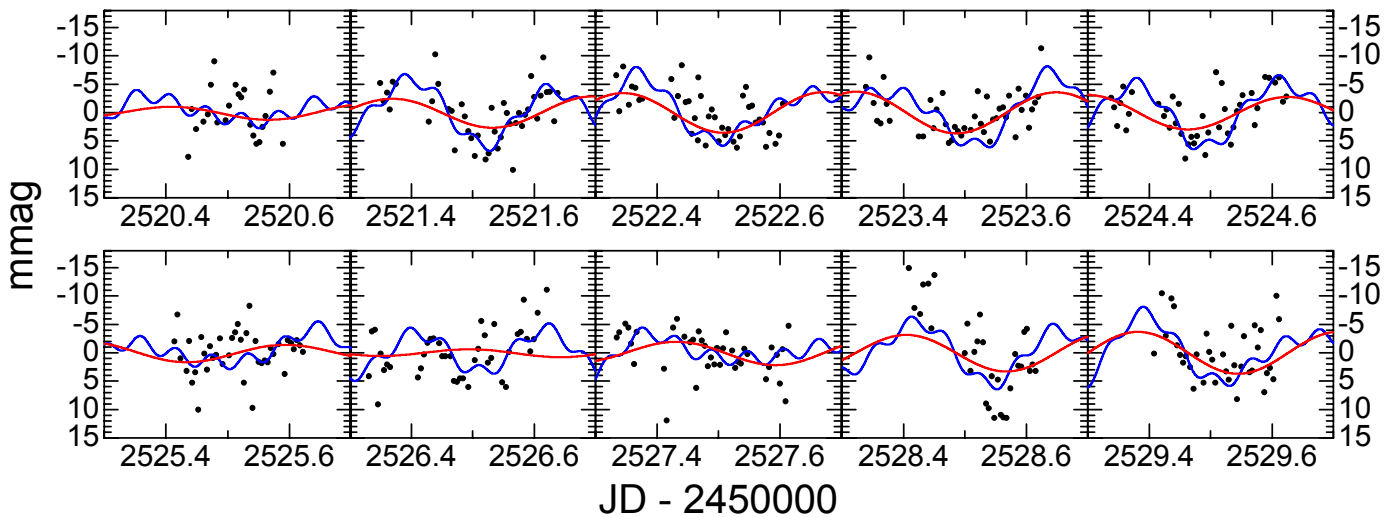
A New PMS Variable?

- **IC 4996 # 89**



- **S/N = 4:**
  - 5 Frequencies
- **SigSpec:**
  - 2.98 c/d ➡ 1-day alias
  - 3.13 c/d ➡ background

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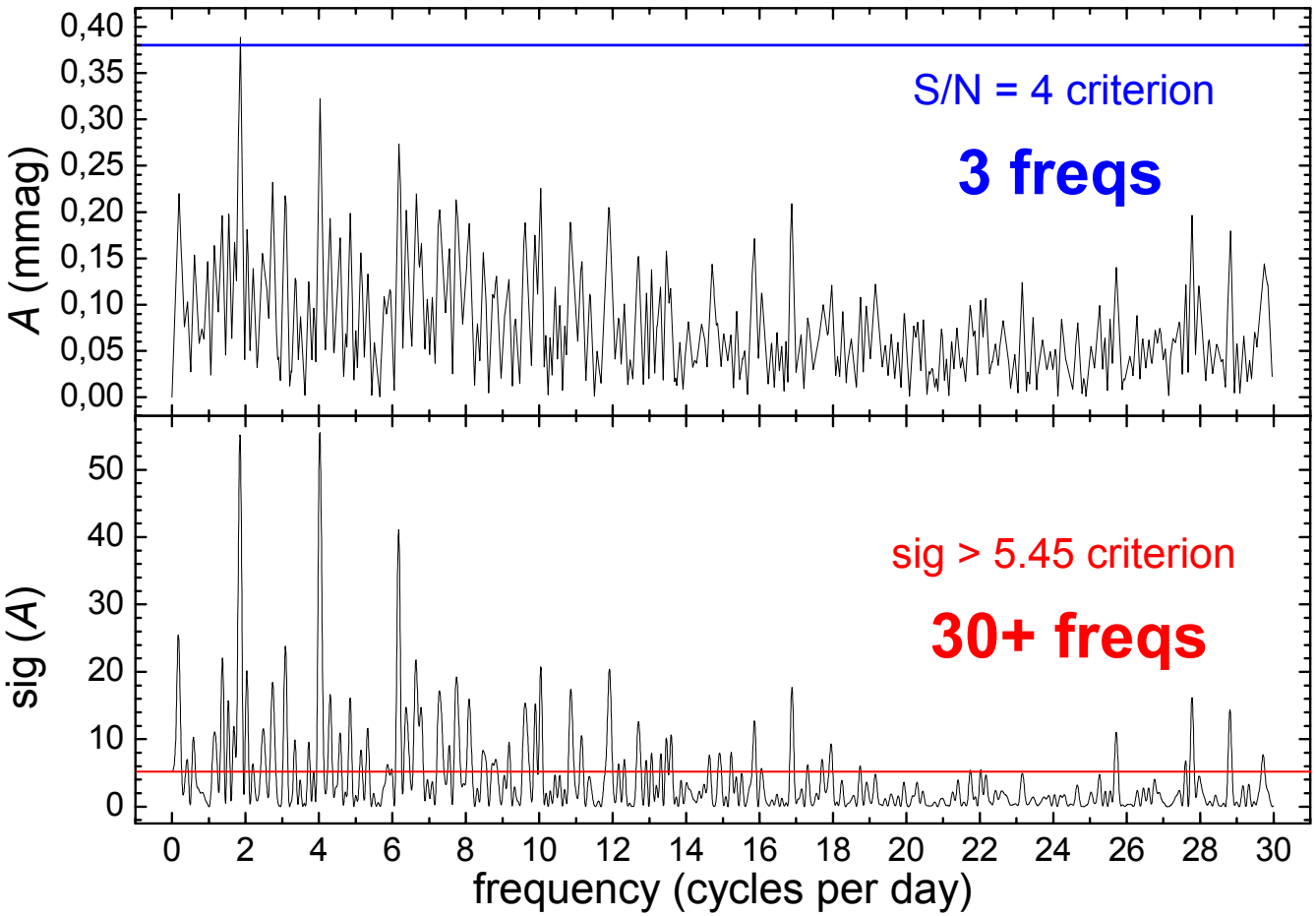
Space Data

- **GSC 09137-03505 @ HST-FGS**



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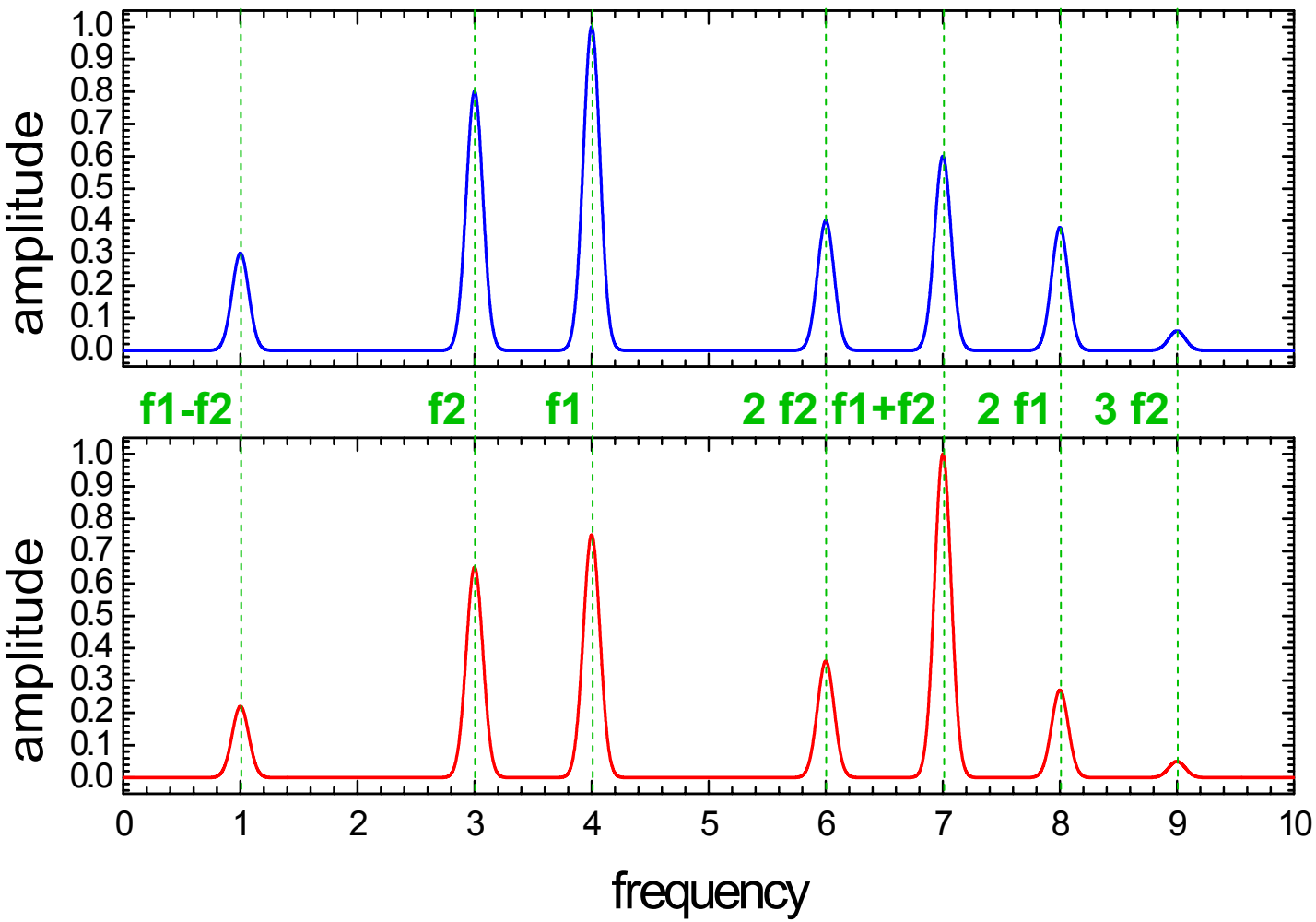
Linear Combinations



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COMBINE

- **consecutive analysis of SIGSPEC output**
- **attempt to interpret a given peak frequency as a linear combination**
  - on failure ⇨ "genuine" peak
  - only previous genuine peaks are used for combinations
- **multiple possibilities**
  - definition of equivalent significance
  - comparison to significance of peak under consideration

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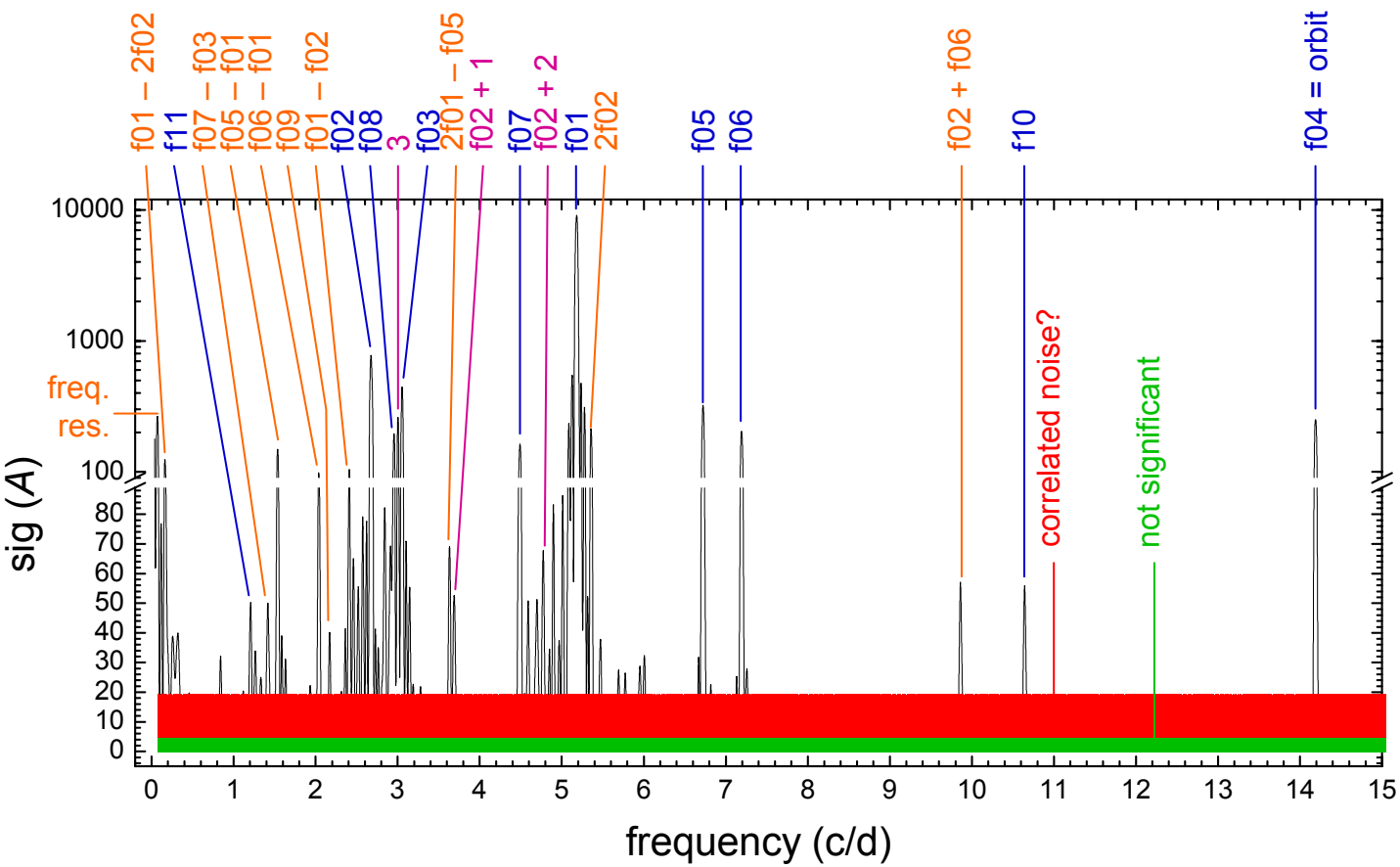

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Combination Frequencies

- **f_1, f_2 ➡ highest peak at $f_2 - f_1$**
  - $f_1 = 99$, $f_2 = 101$

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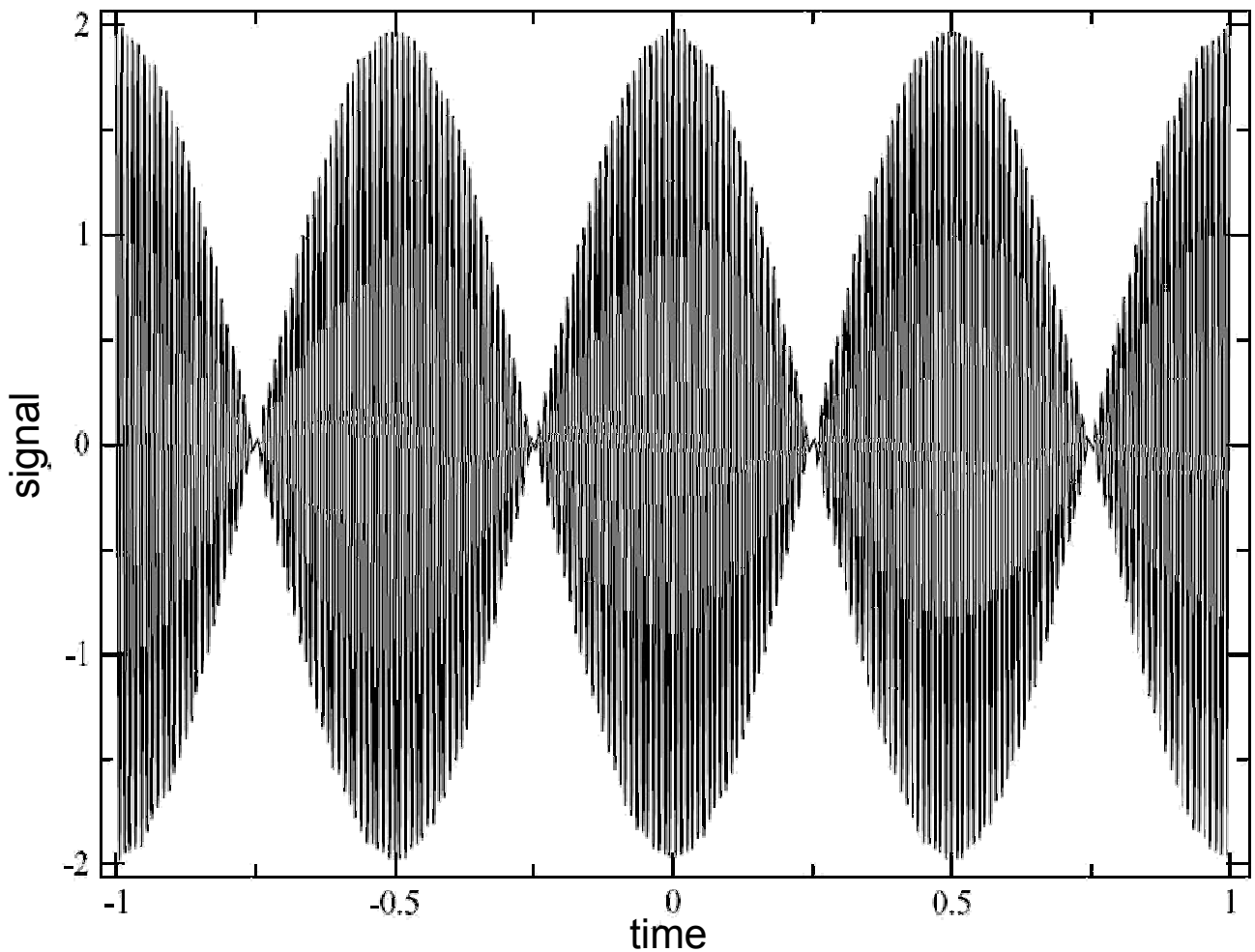
Continuous Signal



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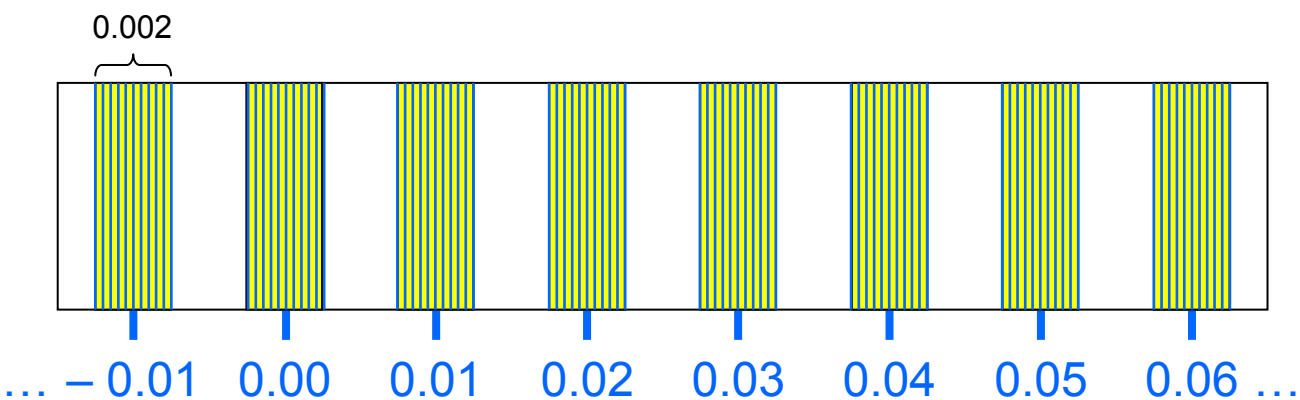
Discrete Sampling

- **f_1, f_2 ➡ highest peak at $f_2 - f_1$**
  - $f_1 = 99$, $f_2 = 101$
  - sampling:
    - about – 1.00 , – 0.99 , – 0.98,…, 0.99, 1.00
    - intervals of width 0.002 with 11 data points



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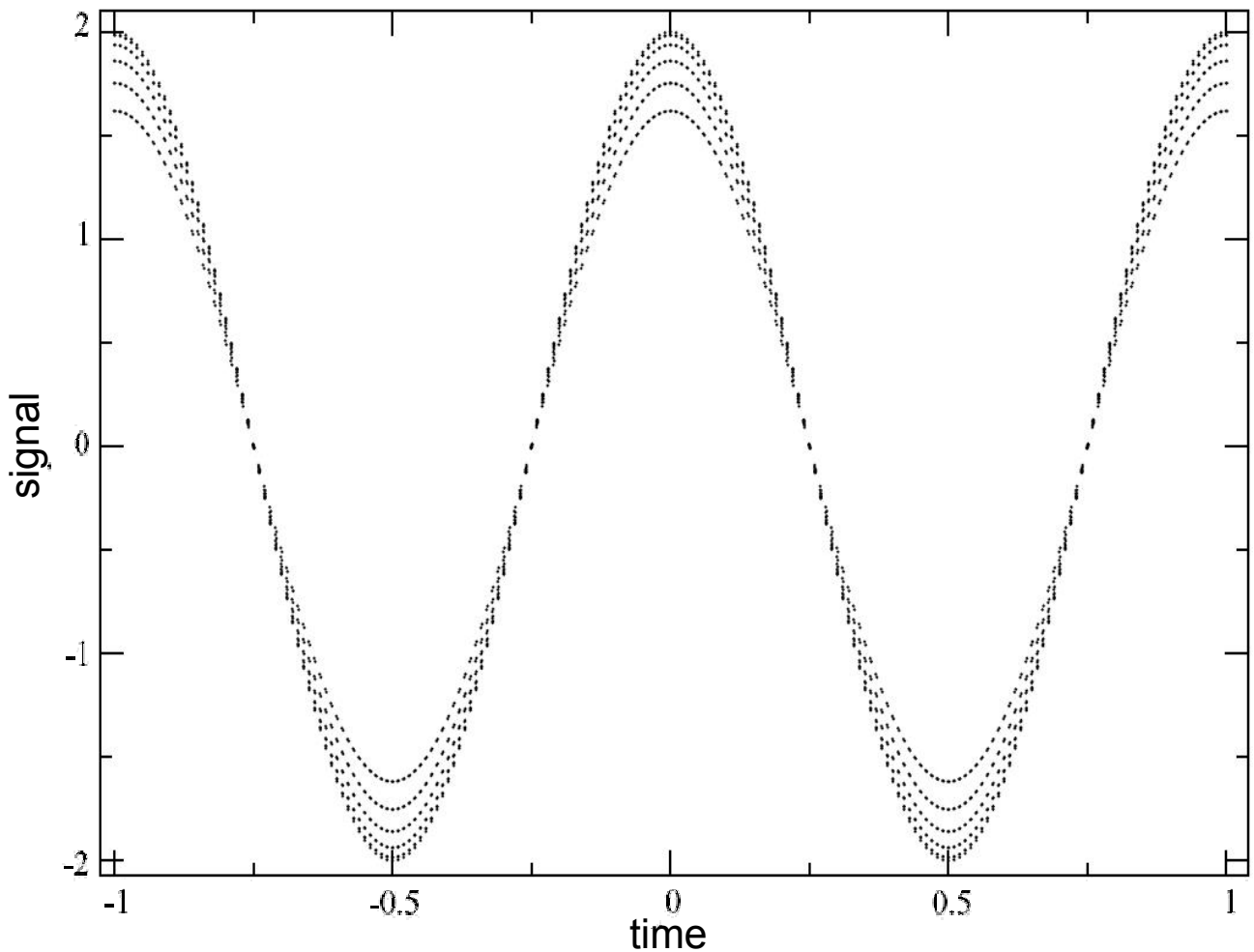

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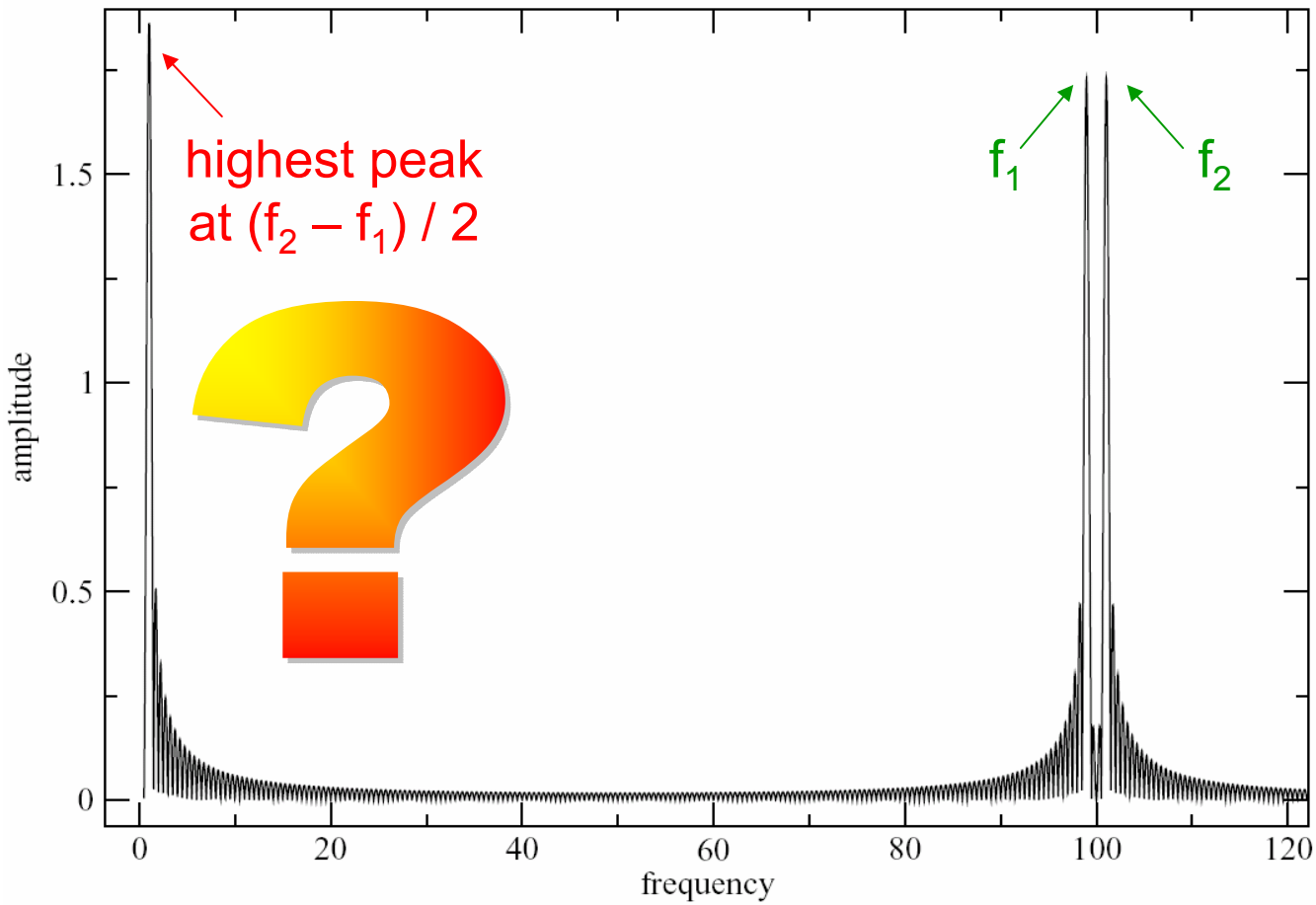
Amplitude Spectrum



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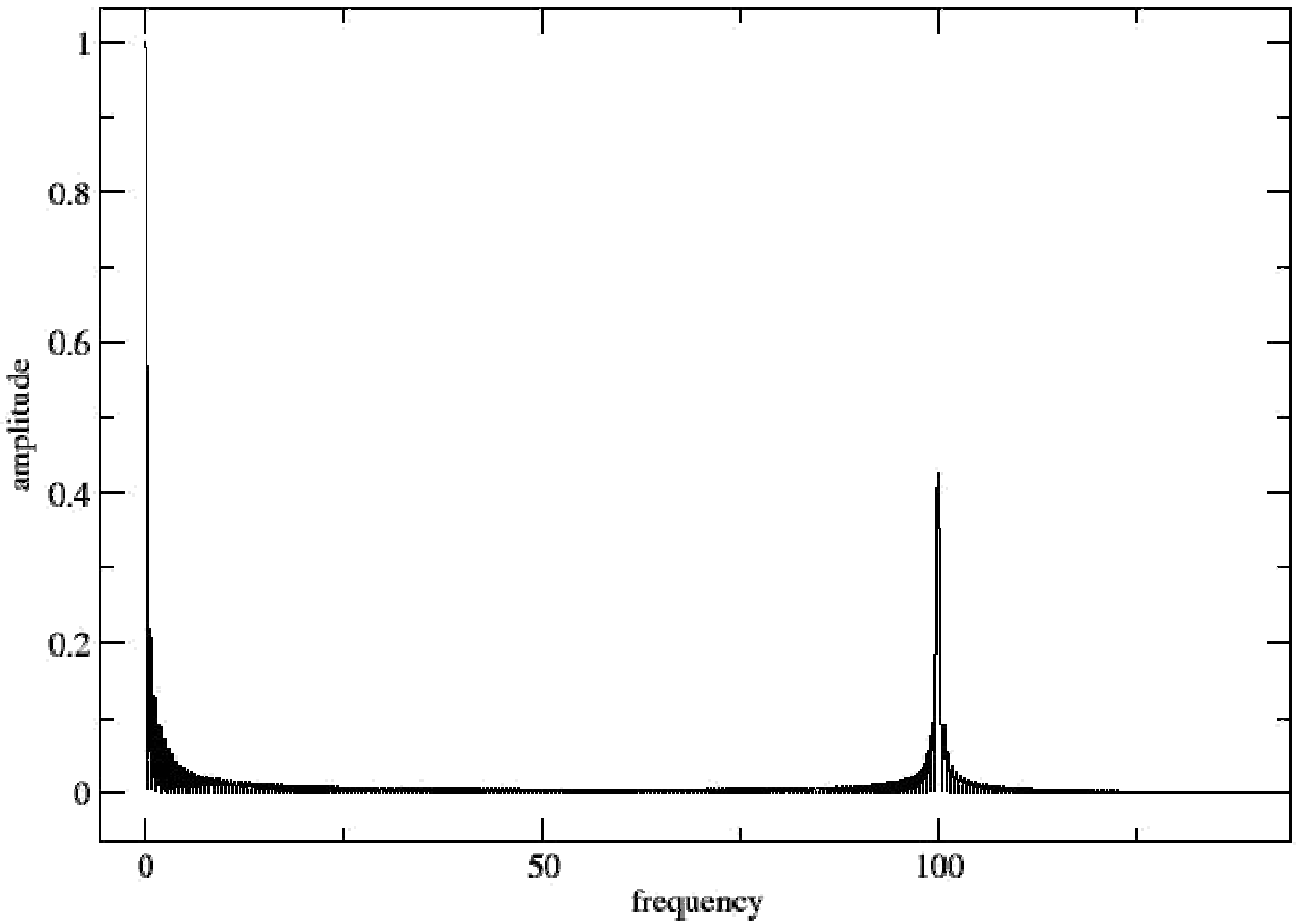
Spectral Window



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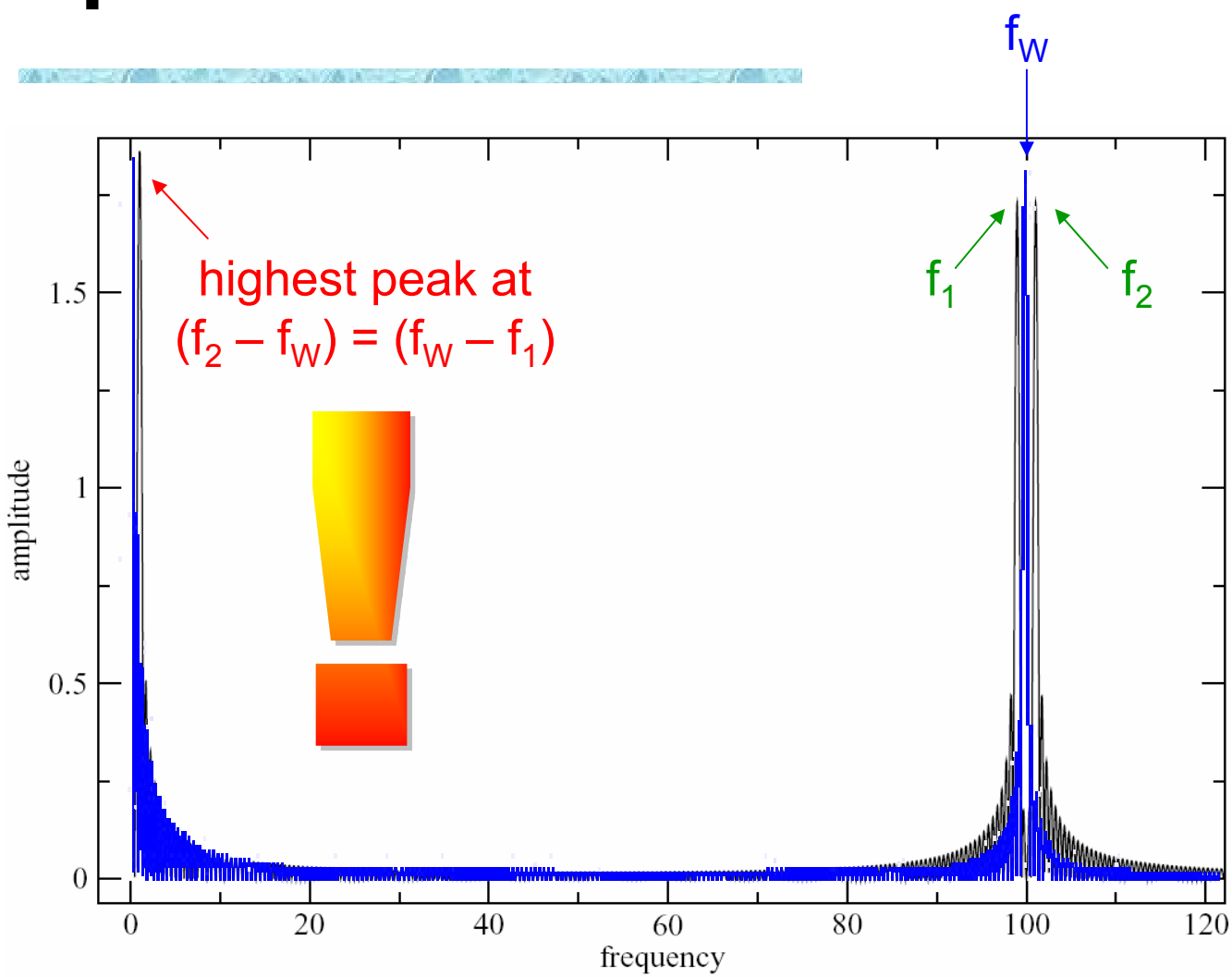

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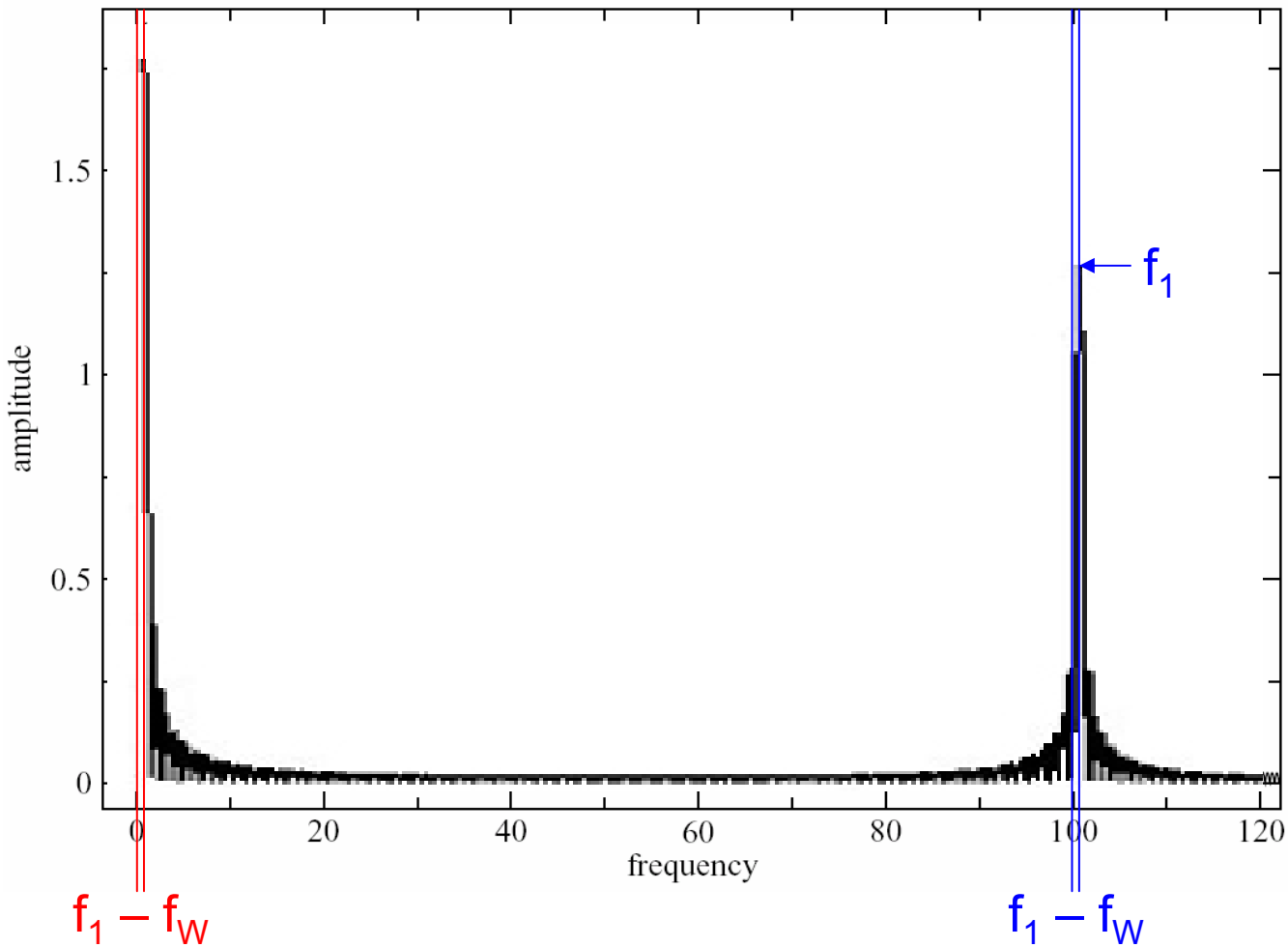
Single Signal



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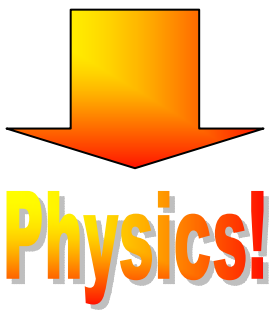
Combination Frequencies

- **Peaks at combination frequencies**
  - Only between signal and spectral window!
  - combination of intrinsic frequencies



- **Implications to MOST … ?**

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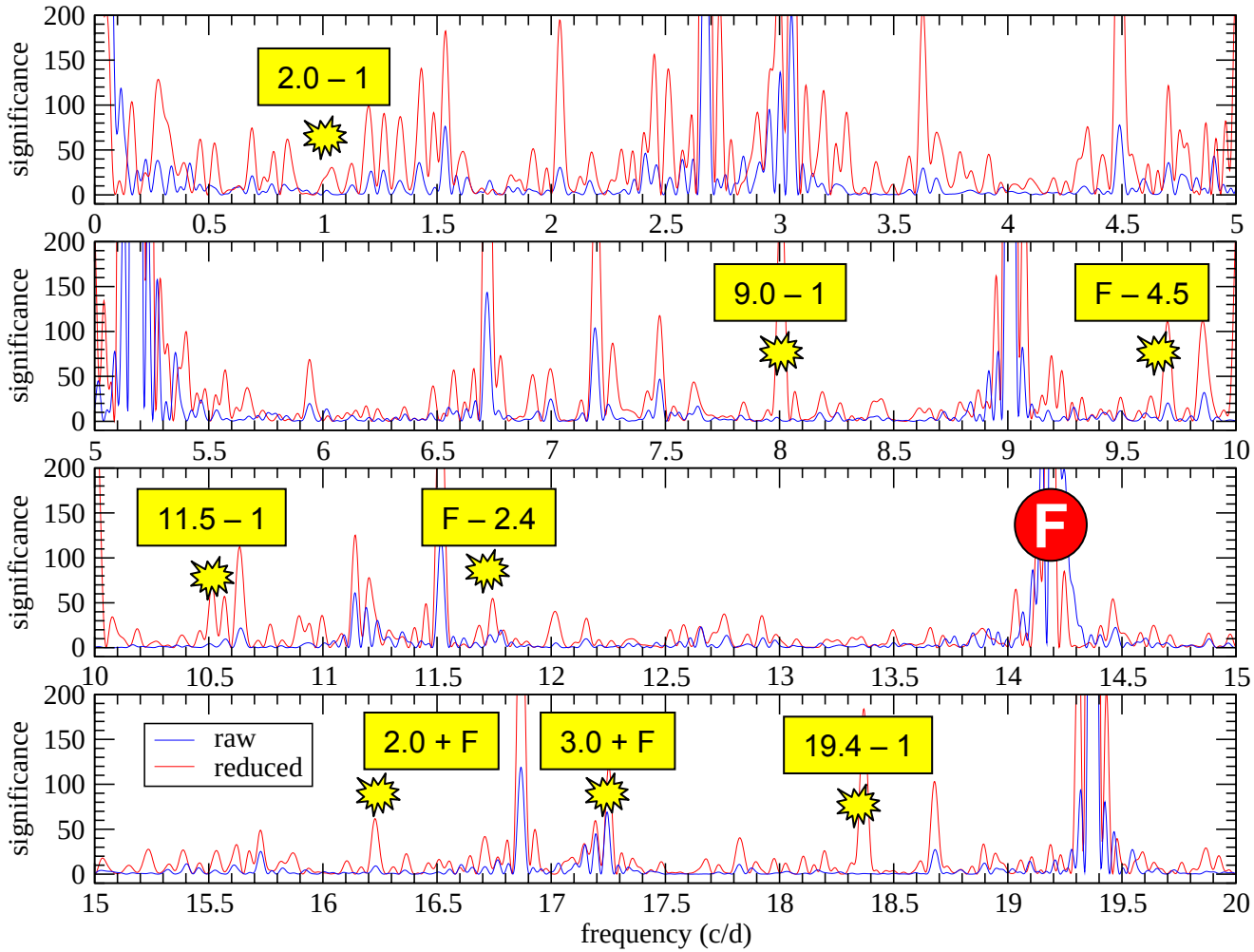

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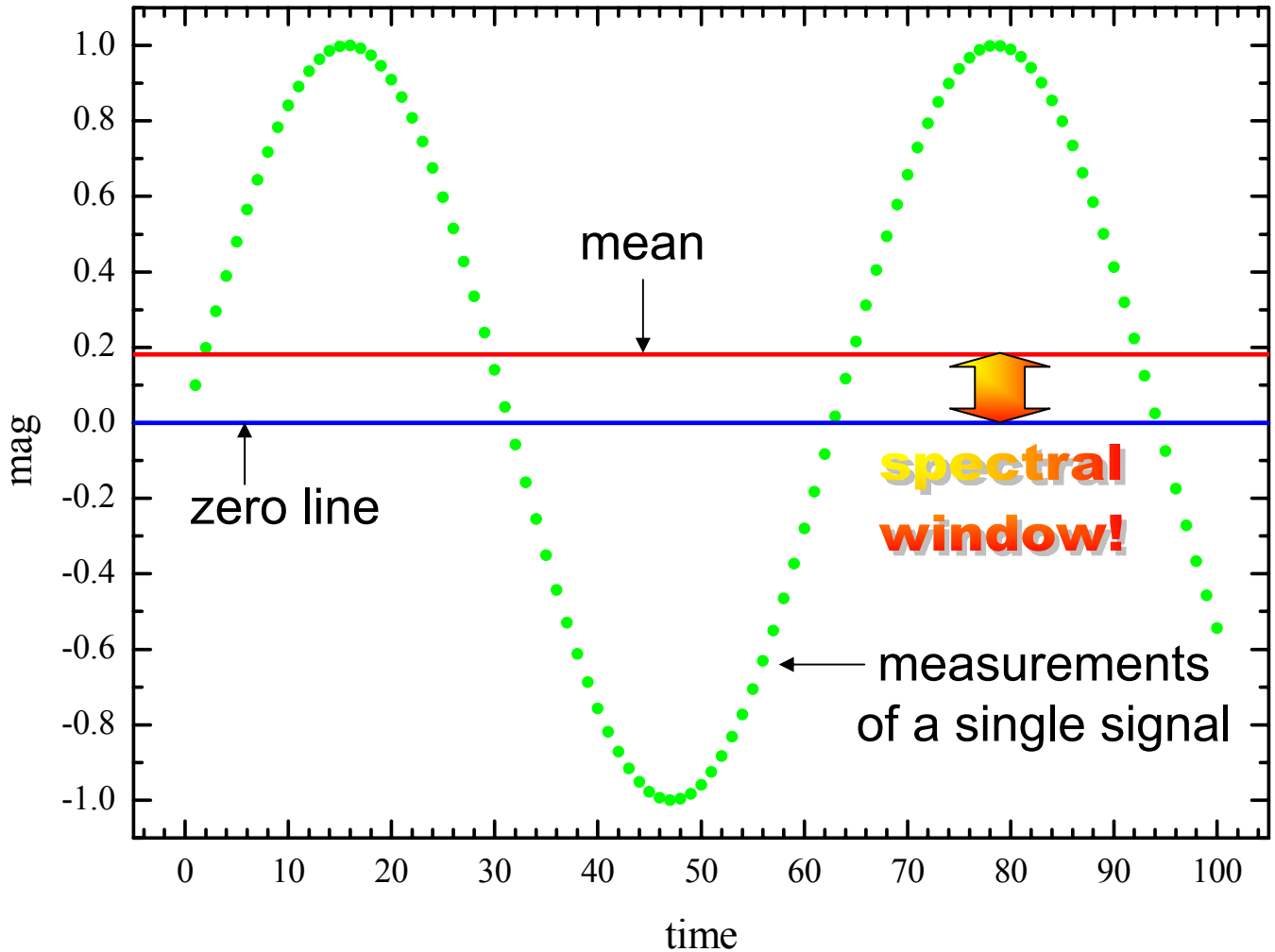
Zero-Mean Correction



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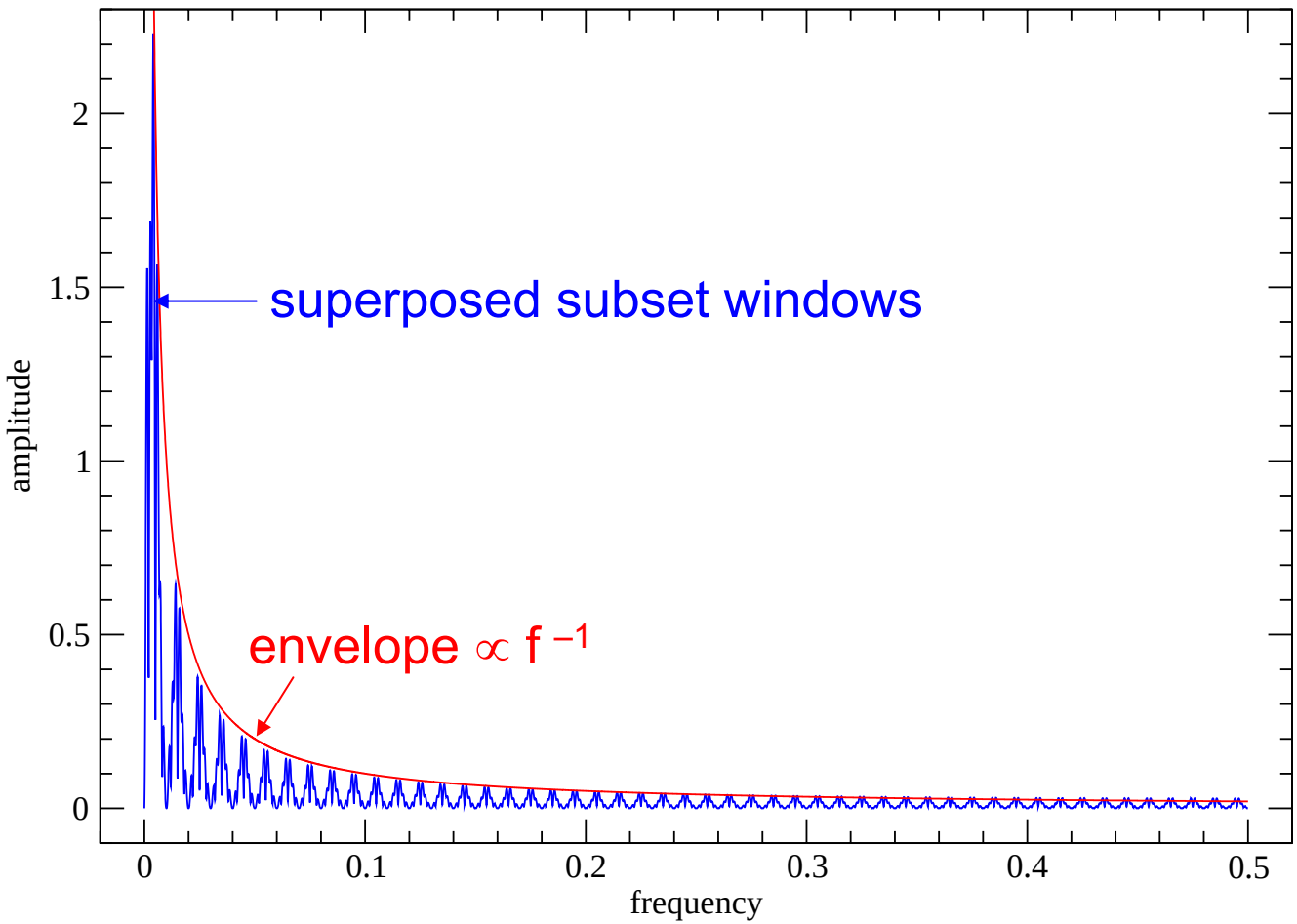

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