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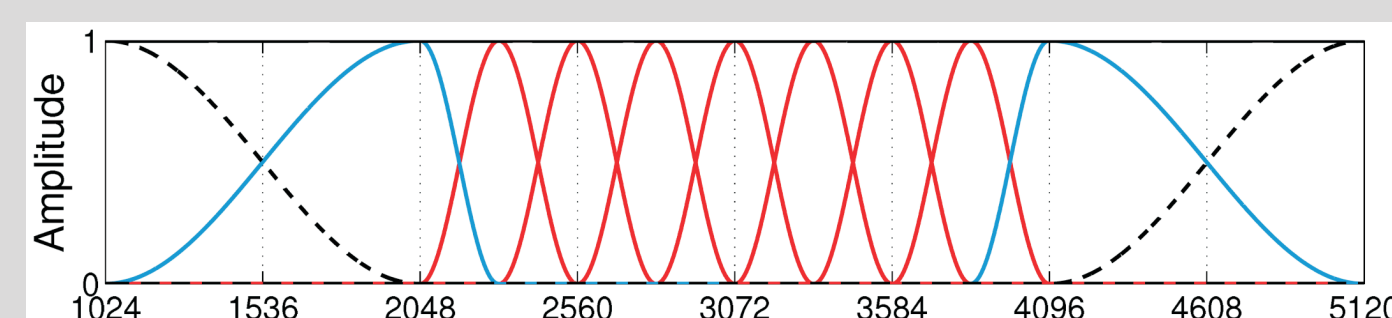
Motivation

- Phase estimation has a wide range of applications, e.g. time/pitch scale modification, source separation, comb-filter free audio mixing.
- Phase estimation algorithms require a fixed length for the STFT.
- Result: Signal-invariant trade-off between time and frequency resolution.

Window Switching

makes this trade-off signal-adaptive.

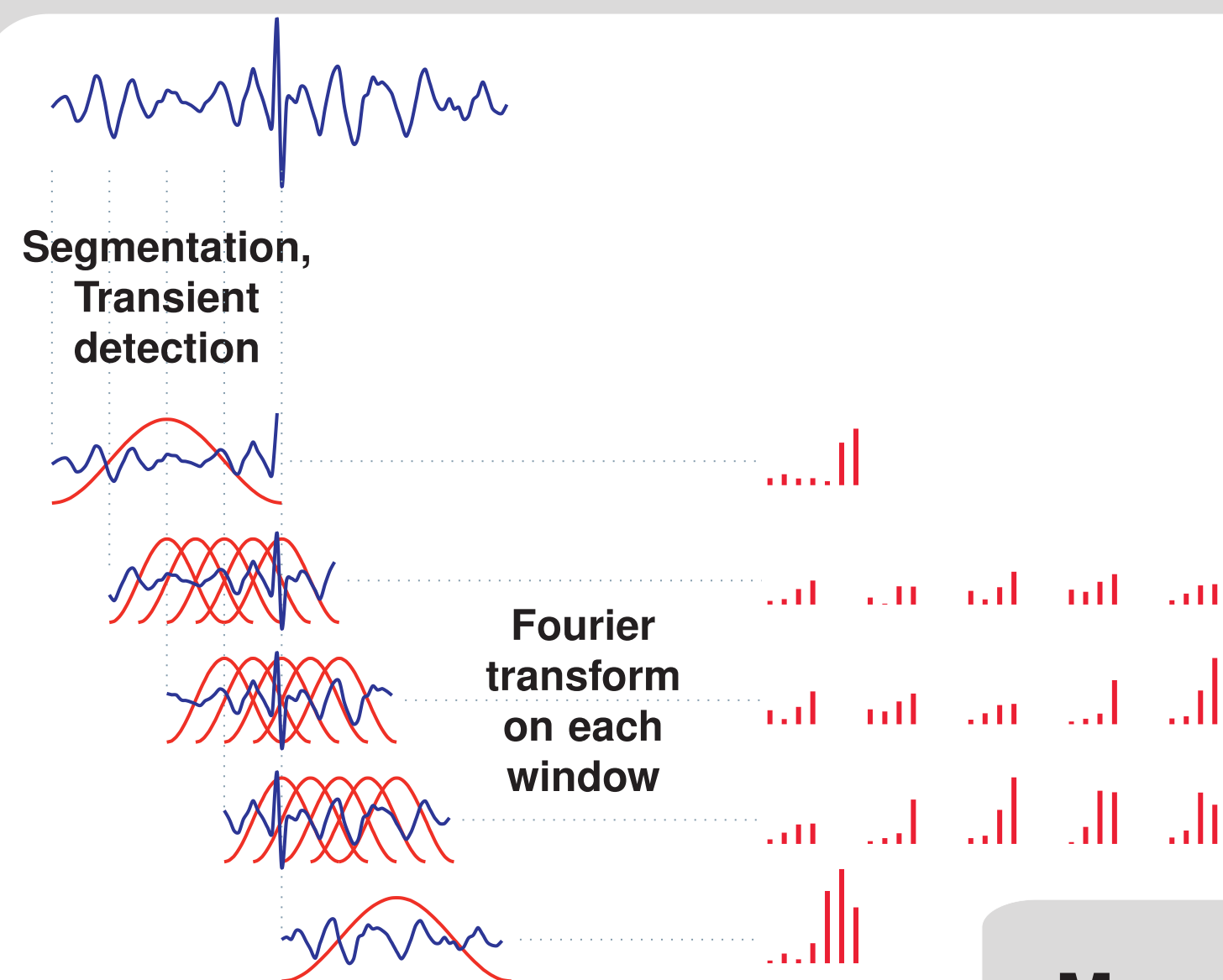
- Uses two STFT window lengths:
Long for steady-state
Short for transients
- Bridge windows save overlap-add property:



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Generation of multi-window-length magnitude spectrograms

- No bridge windows
- One window shape for all window sizes



Magnitude-only Processing

- Arbitrary, depends on the application.
- Must be able to handle two different numbers of FFT coefficients.

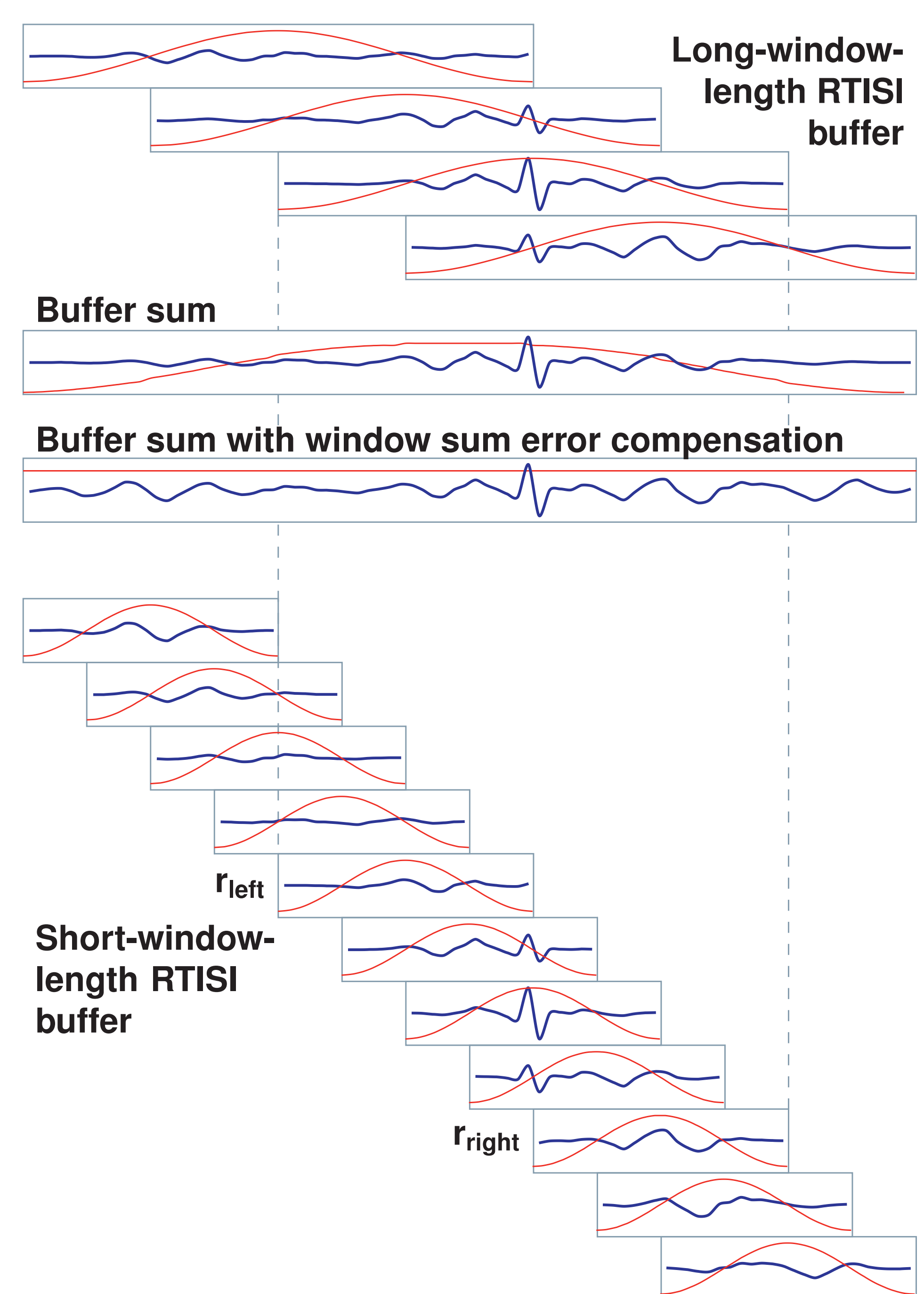
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Signal Reconstruction

- Long-window length buffer = normal mode, short-window length buffer → transient processing
- RTISI algorithm: Iterative combination of buffer sum phase with the given magnitude

Transient processing

- Copy content from long-window length buffer to the short-window length buffer (using window sum error compensation)
- Perform RTISI on the short-window length buffer
- Copy estimated waveform from long-window length buffer back to the short-window length buffer

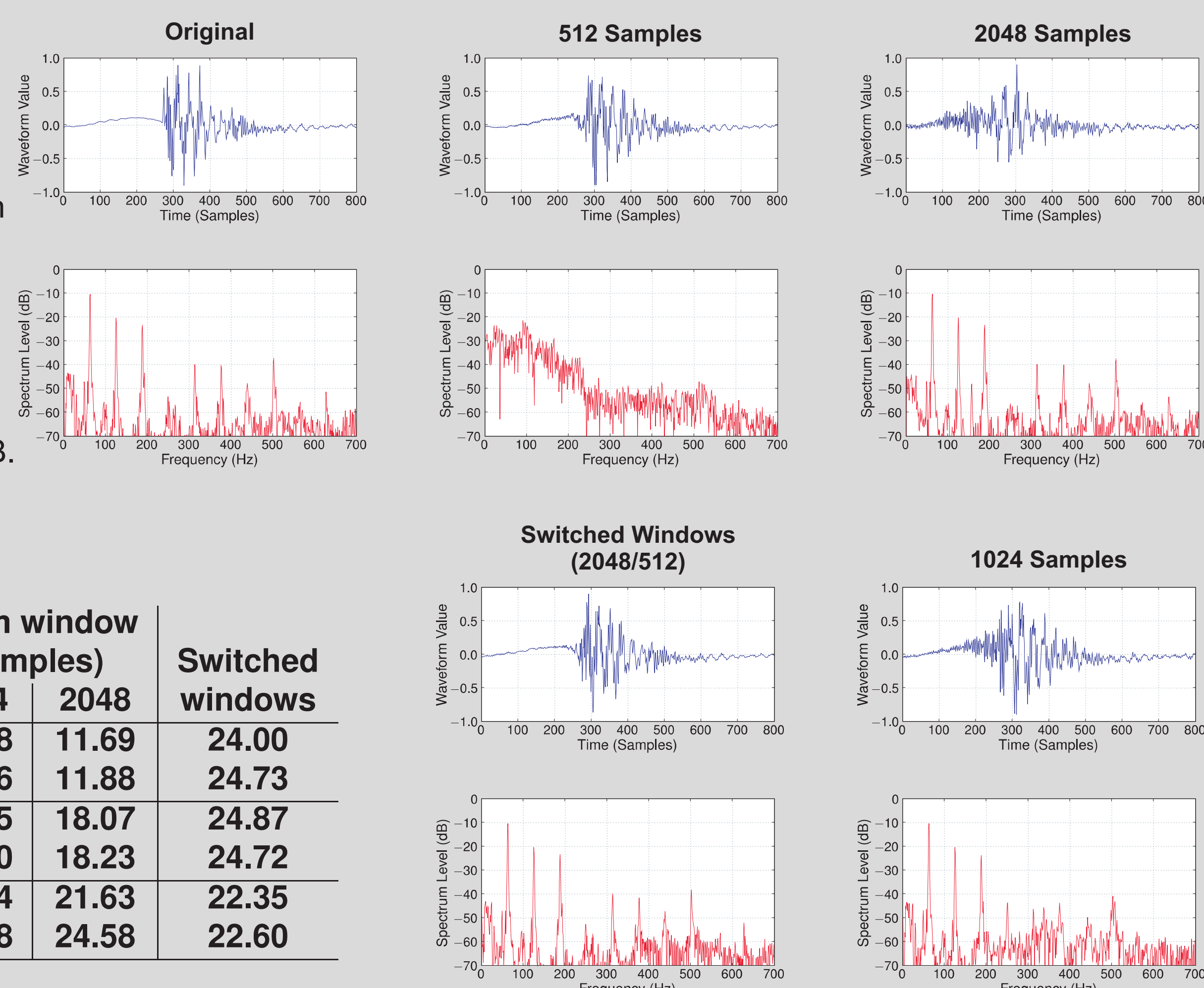


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Results

- Example mixture of a double bass and a castanet signal (from EBU: SQAM)
- Castanets require a high temporal, double bass a high frequency resolution
- Table below: STFT-magnitude signal-to-error ratios (SER) in dB.

SER measure window length (samples)	Spectrogram window length (samples)			Switched windows
	512	1024	2048	
500	16.27	13.48	11.69	24.00
512	18.37	13.86	11.88	24.73
1000	14.80	24.05	18.07	24.87
1024	14.79	26.10	18.23	24.72
2000	11.21	22.14	21.63	22.35
2048	11.14	22.18	24.58	22.60



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Conclusions

- This method enables window switching on algorithms that operate on magnitude-only spectra.
- Thus, it helps to improve the time/frequency resolution tradeoff, allowing quality improvements of time-frequency domain algorithms.
- Extension to more than two window lengths is straightforward, but needs a method to determine the optimal window length.