

Assessing the Processing of Interaural Temporal Disparities within High Frequency Stimuli via Manipulations of the Temporal Signatures of their Envelopes

Leslie R. Bernstein & Constantine Trahiotis

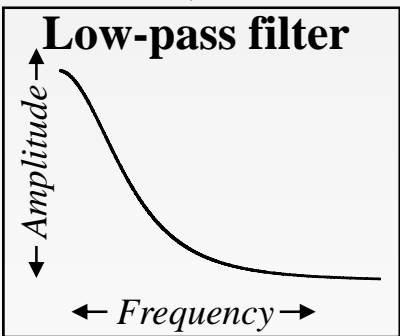
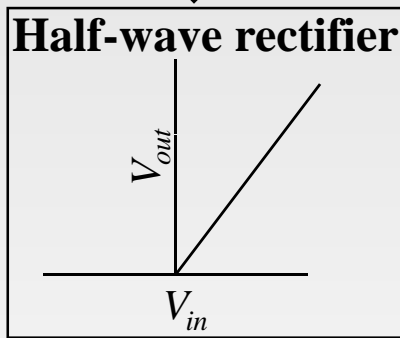
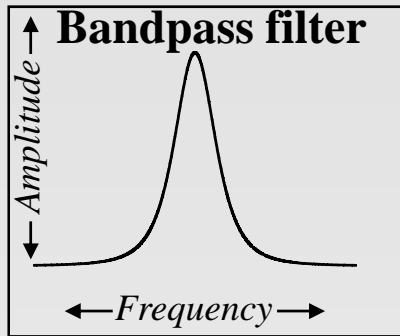


ITD Processing Low vs. High Frequencies

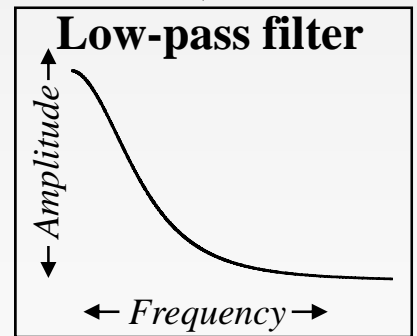
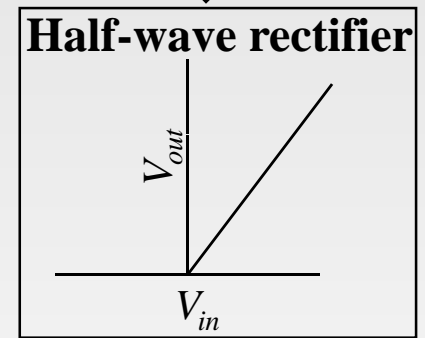
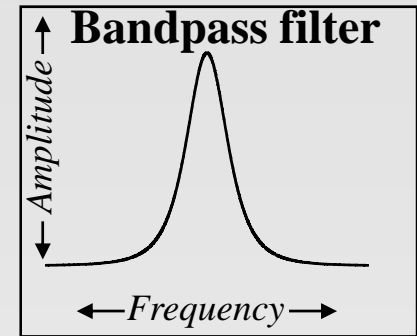
- **Poorer sensitivity at high frequencies**
- **Lesser extent of laterality at high frequencies**

Why?

LEFT EAR



RIGHT EAR



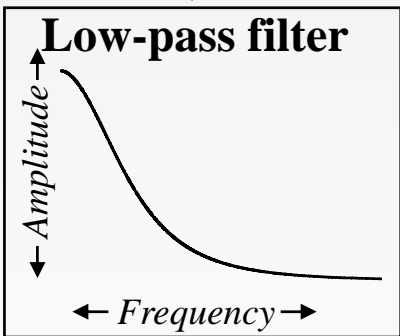
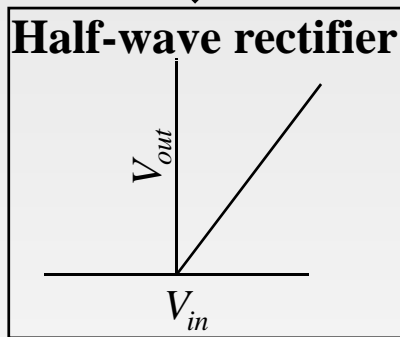
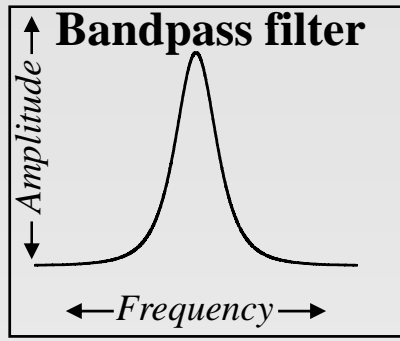
Colburn and Esquissaud's Hypothesis

Differences in performance across frequency result from different nature of input to the binaural processor

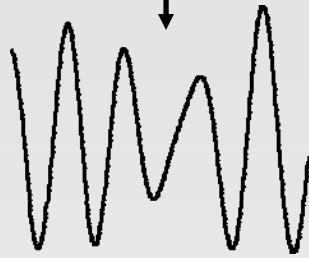
Binaural Processor

Operates uniformly across frequency

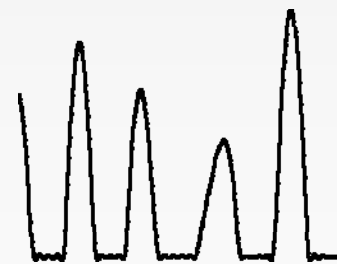
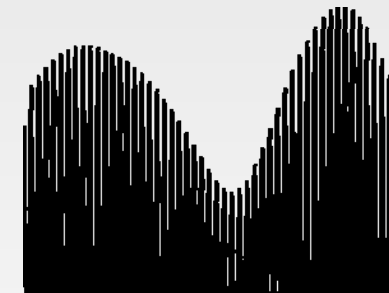
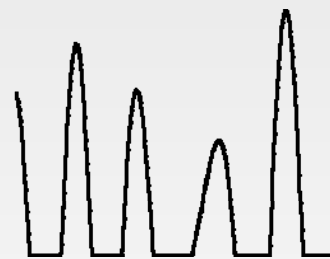
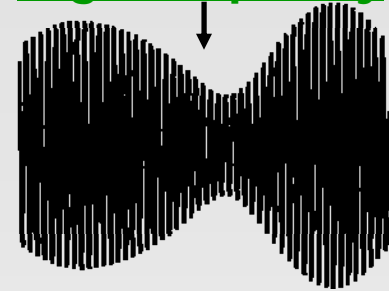
Peripheral Processing



Low frequency



High frequency



Gammatone
filter-bank

Compressor

Rectifier

Low-pass filter
@425 Hz

Gammatone
filter-bank

Compressor

Rectifier

Low-pass filter
@425 Hz

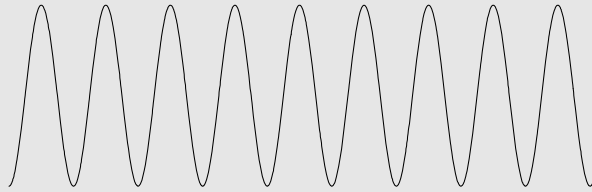
Interaural Correlator



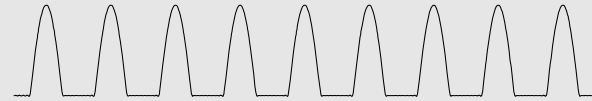
INPUT

**AFTER
COCHLEAR
PROCESSING**

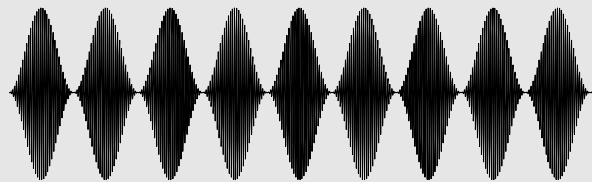
Displacement



SINE



Displacement



SAM

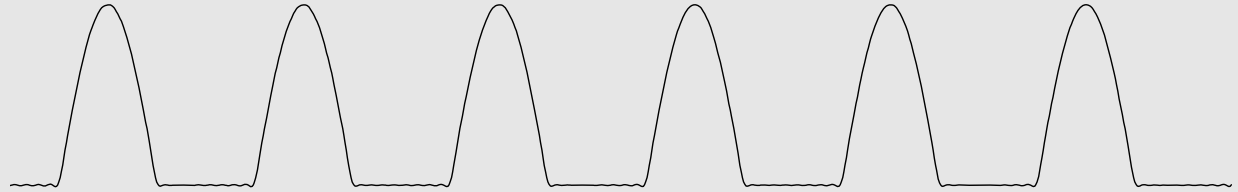


Time

Time

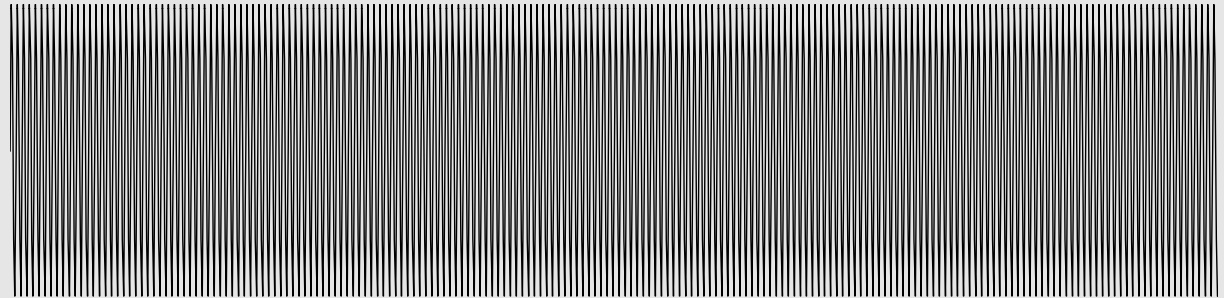
Transposition

Rectified/filtered tone



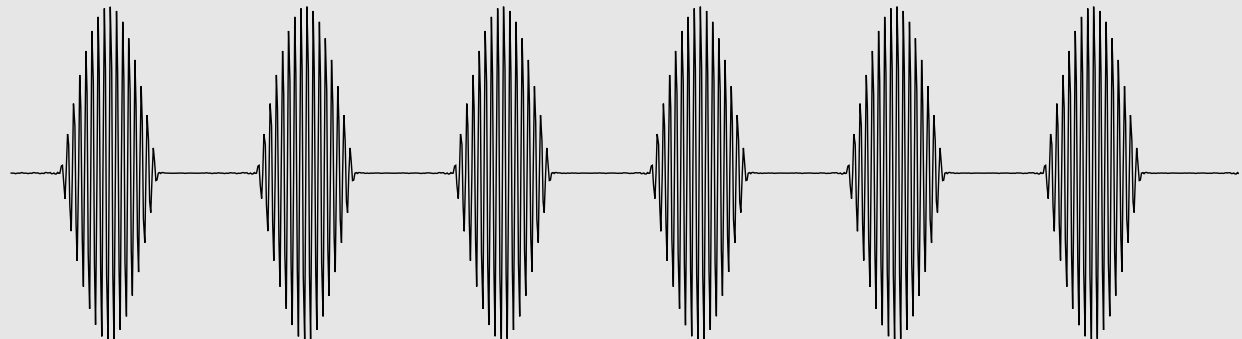
\times

High-frequency tone



$=$

“Transposed” stimulus

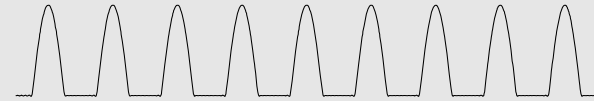
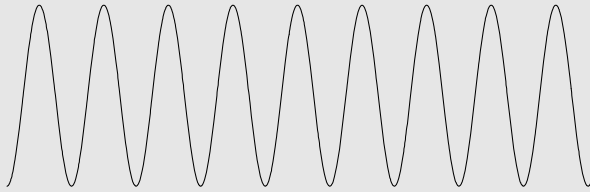


INPUT

AFTER COCHLEAR PROCESSING

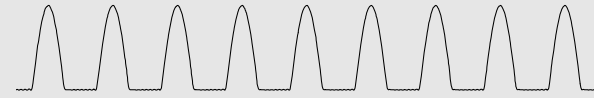
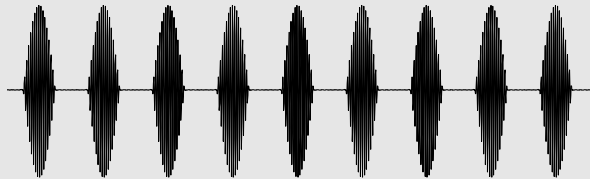
SINE

Displacement



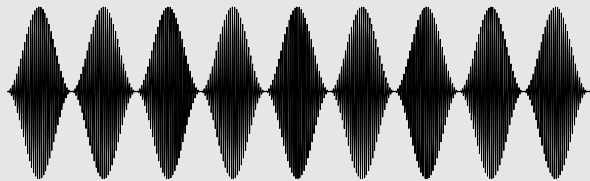
TRANSPOSSED SINE

Displacement



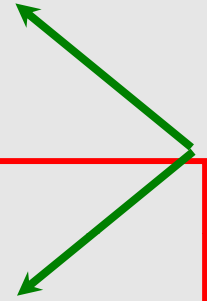
SAM

Displacement

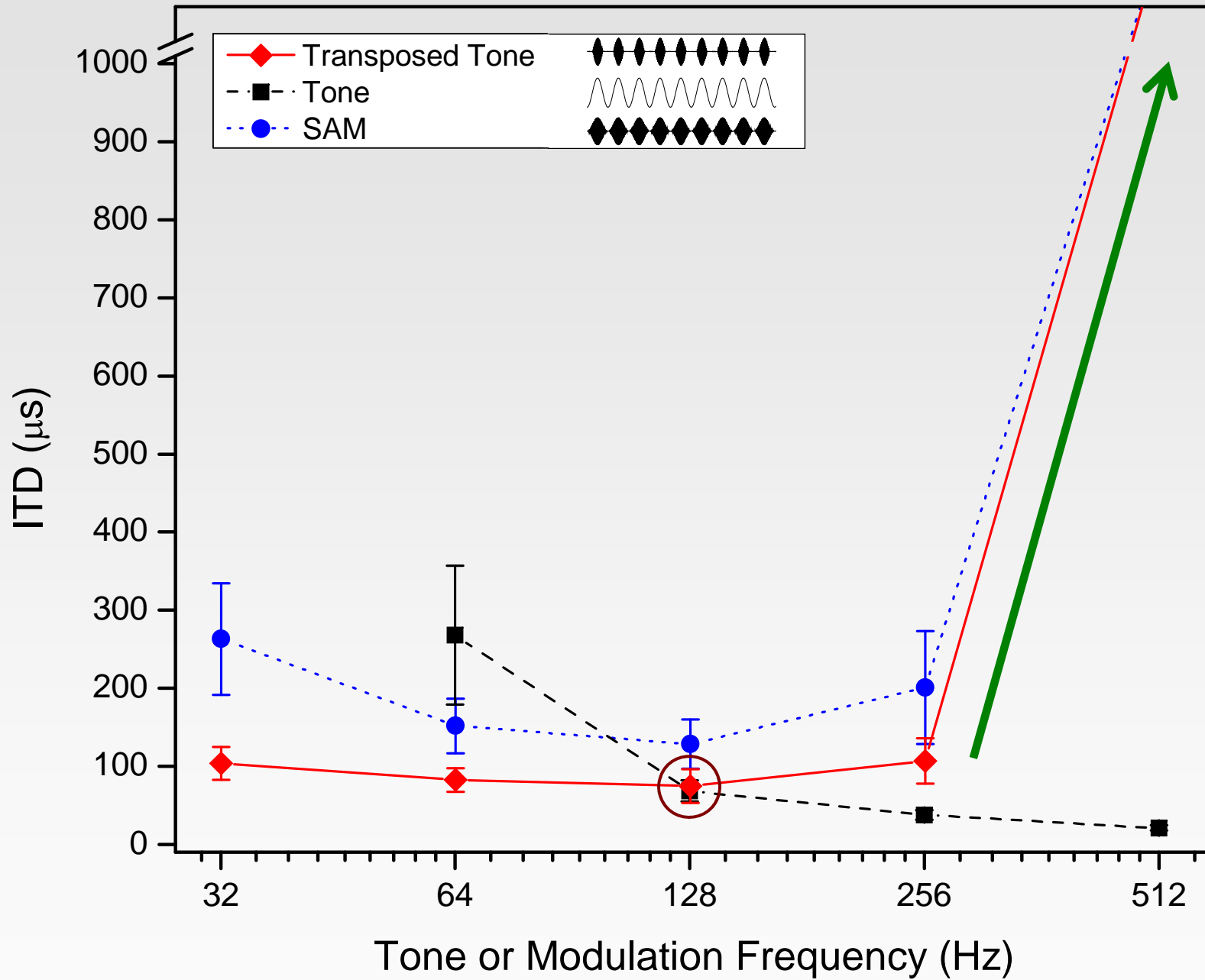


Time

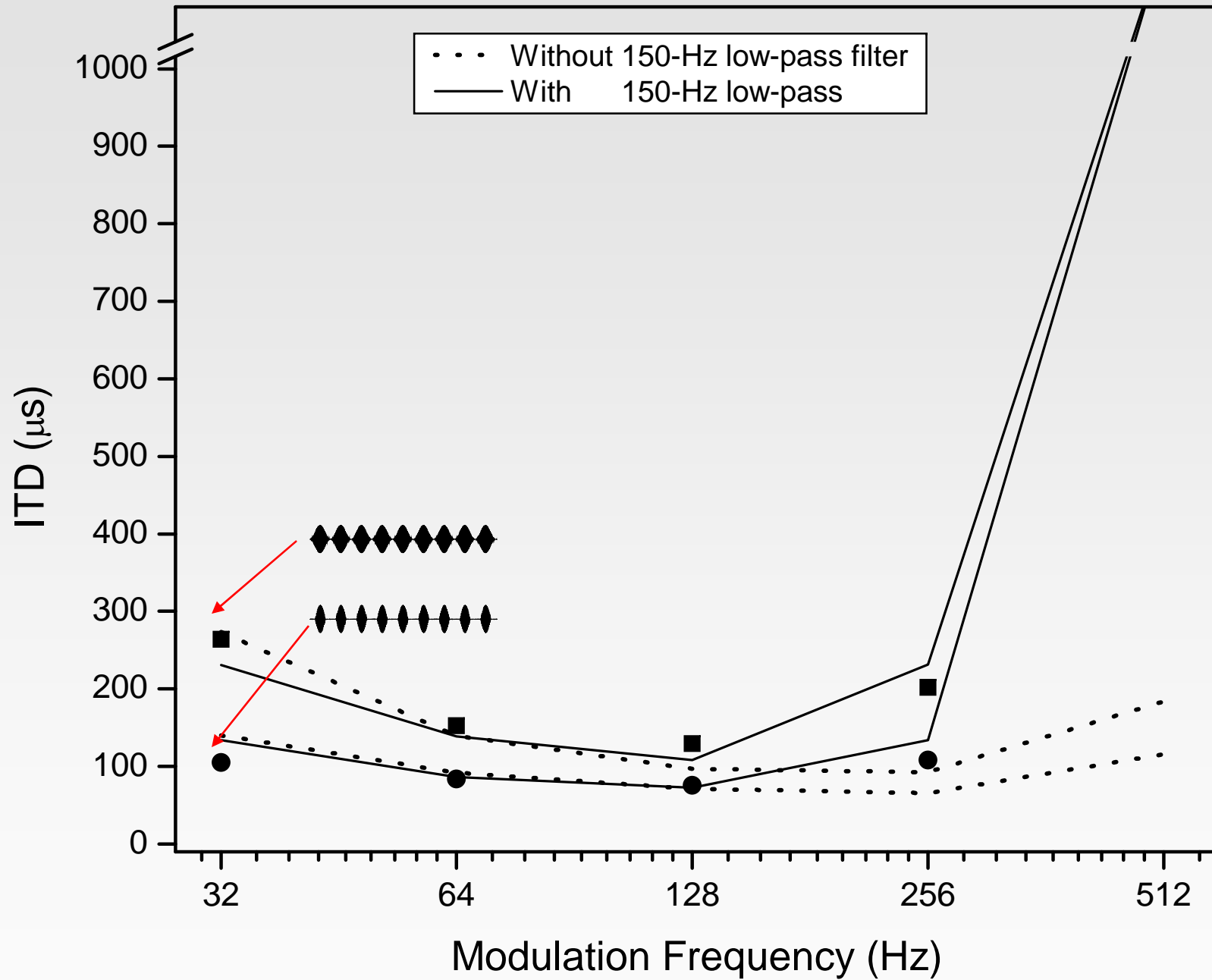
Time

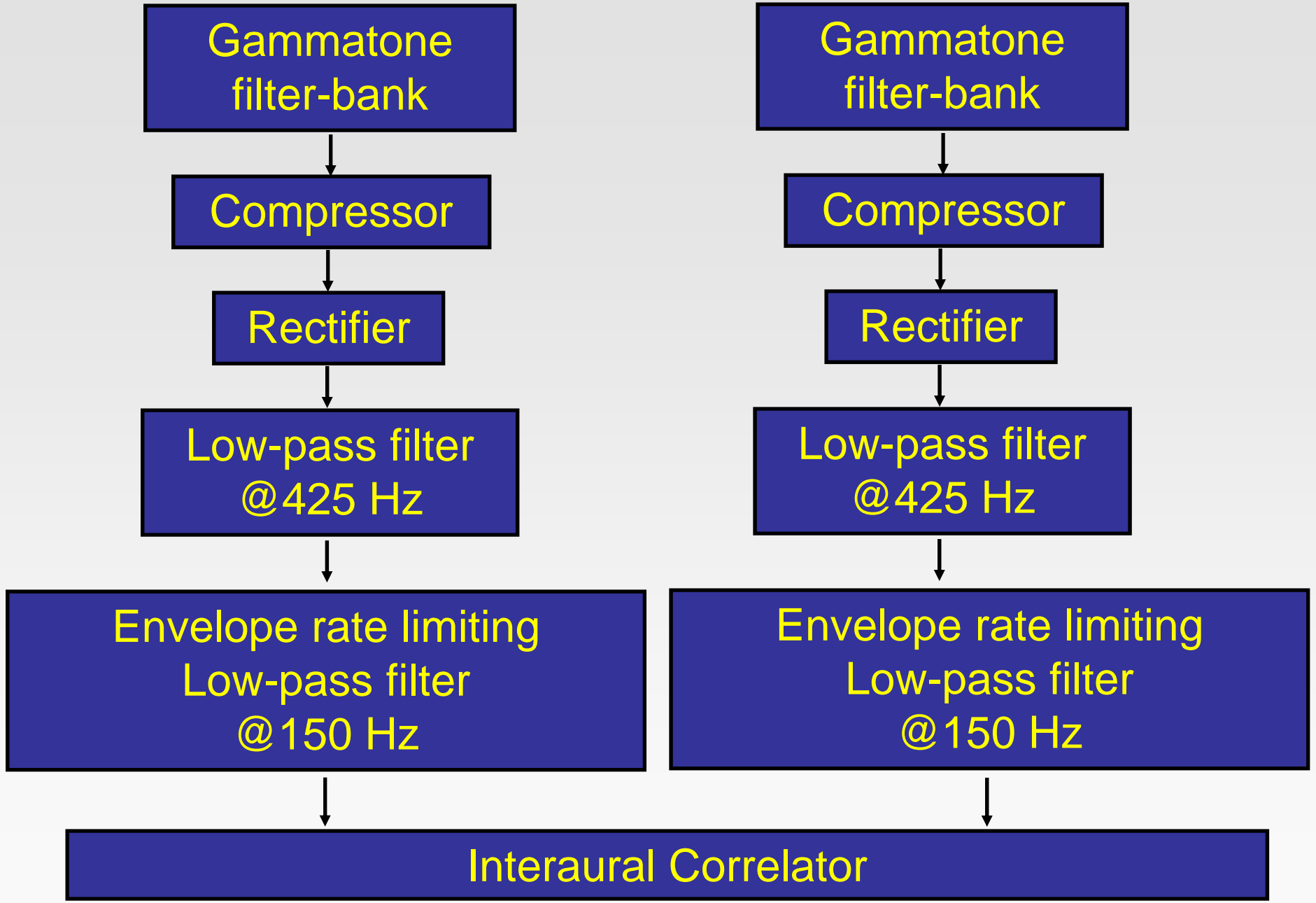


CF: 4 kHz



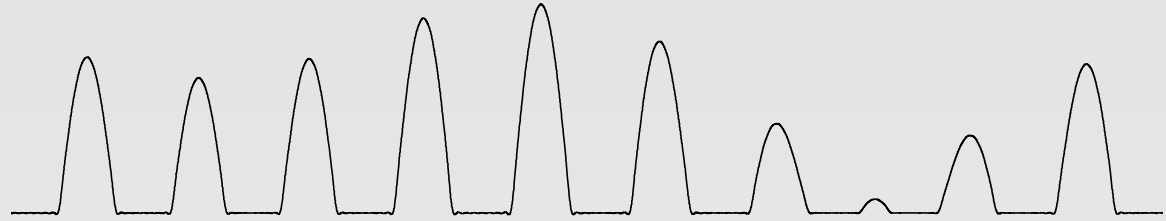
CF: 4 kHz





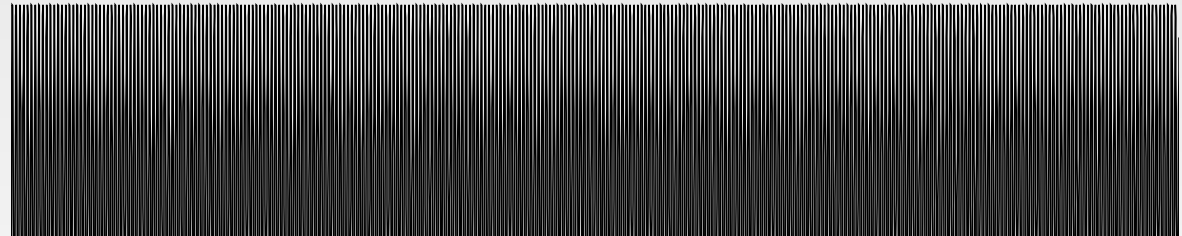
Transposition

Rectified/filtered noise



×

High-frequency tone



=

“Transposed” stimulus

