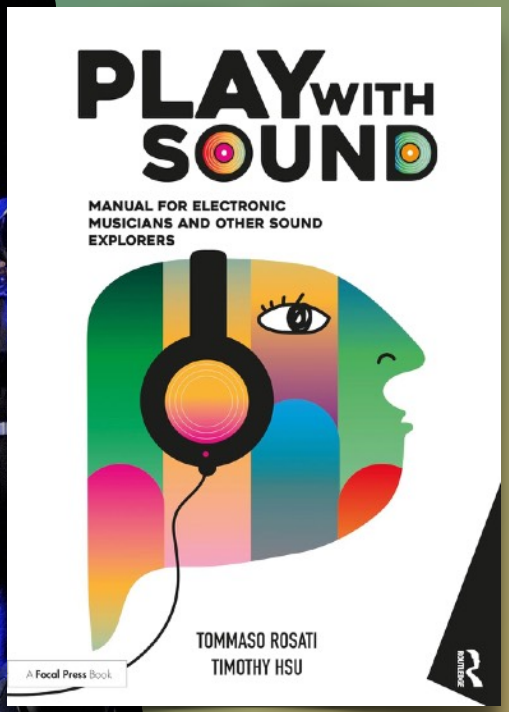
SOUND4

PHASE
BEATS
BALANCED SIGNAL

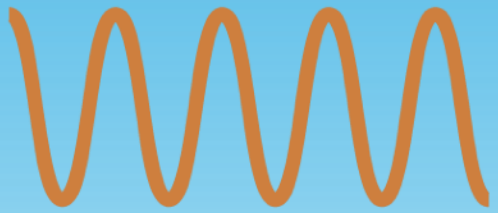
THE BOOK IS NOW AVAILABLE!



SOURCE

WAVE

AUDITORY SYSTEM

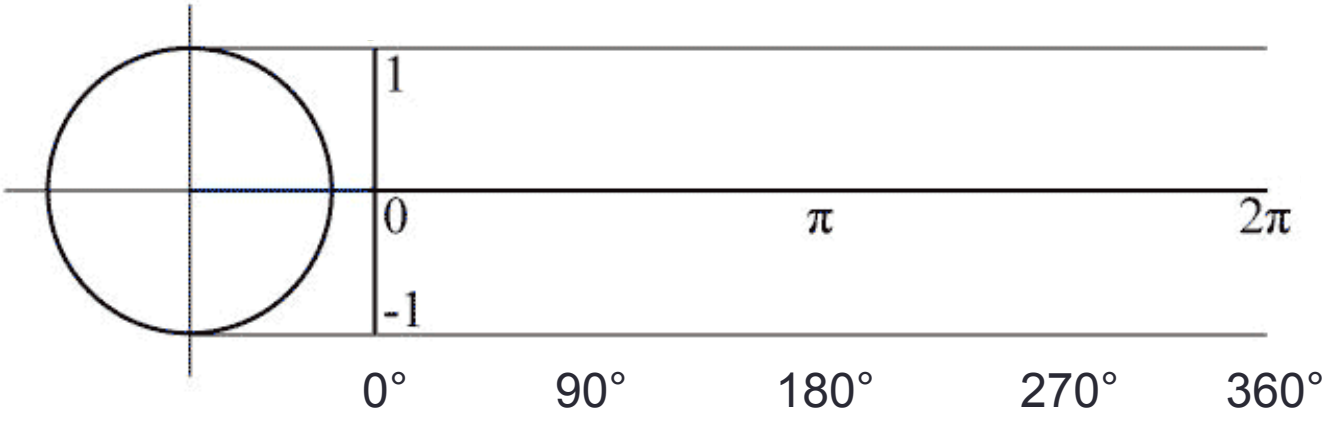


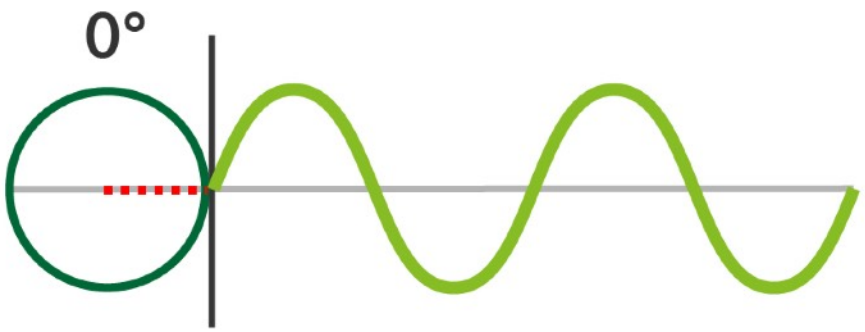
ELASTIC MEDIUM

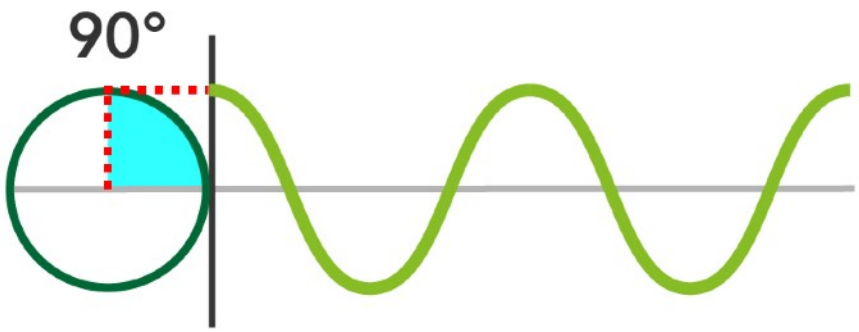
Phase

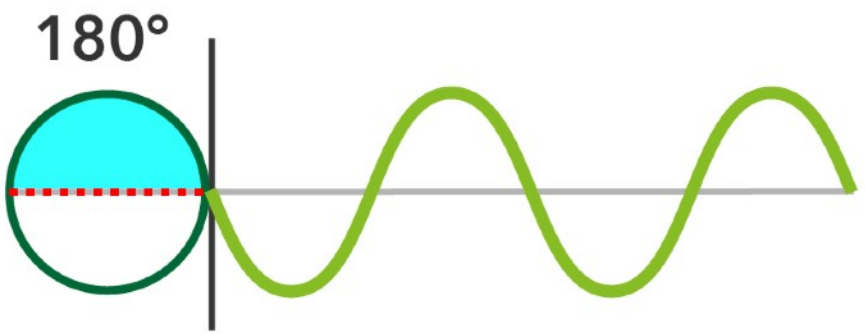
The **Phase ϕ (phi)**, is the parameter that indicates the position where a wave is in its cycle at a given instant.

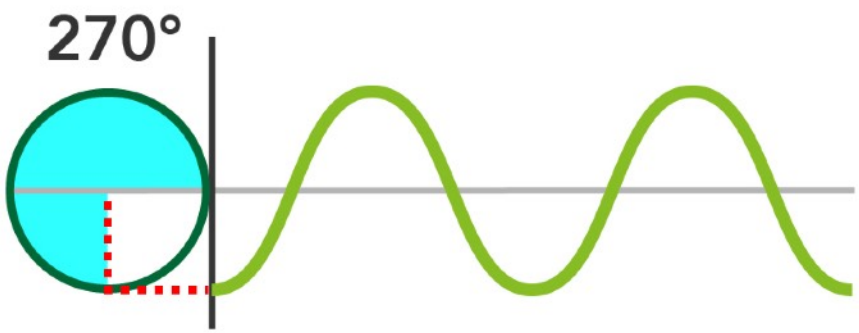
It's measured in degrees (0°, 90°, 180°...).




0°

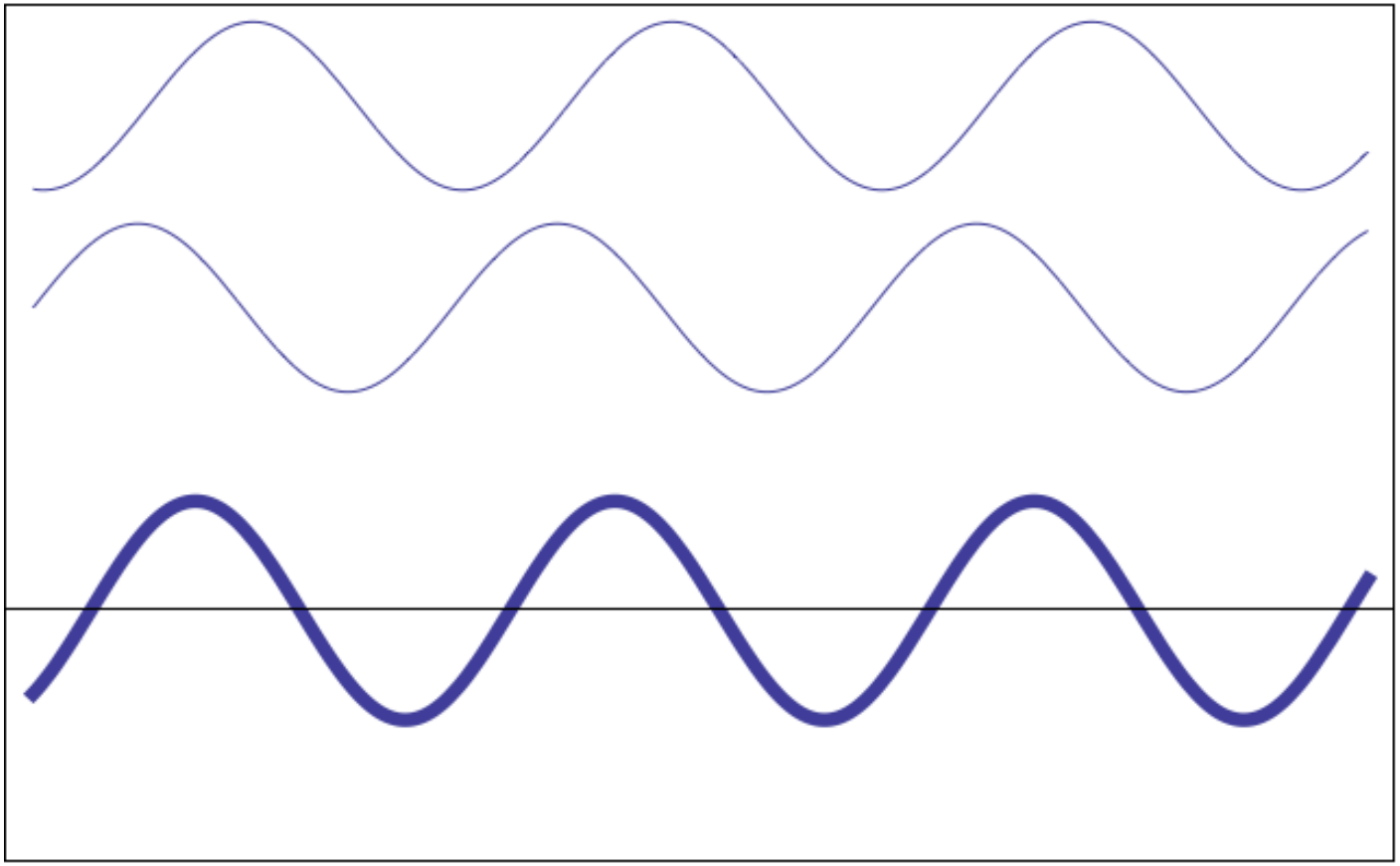

90°


180°


270°

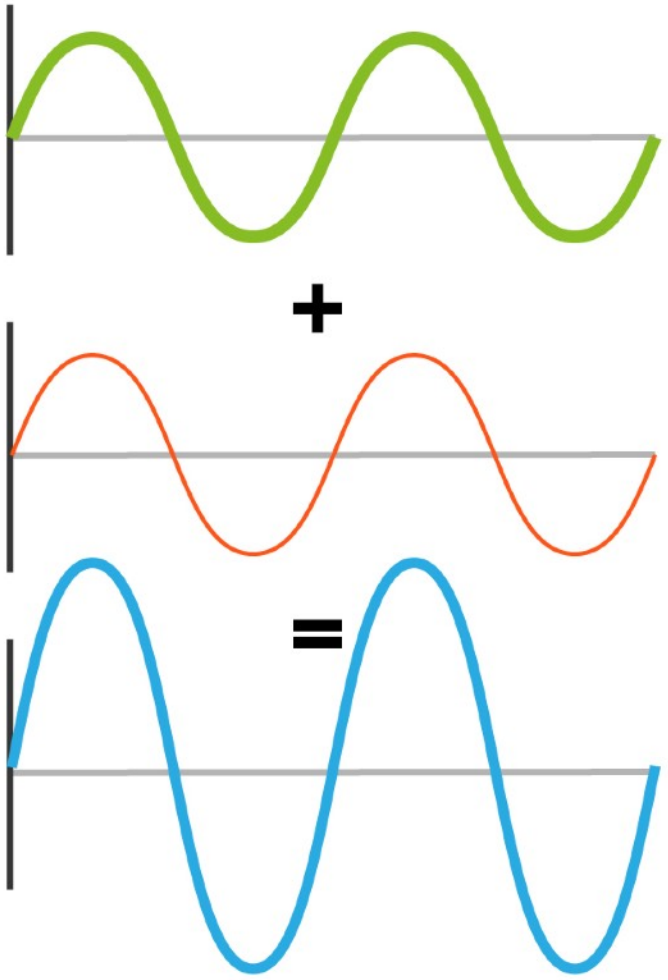
Sum of waves

Adding two waves together results in a wave that is the algebraic sum of the amplitude values of the two initial waves, taken instant by instant.



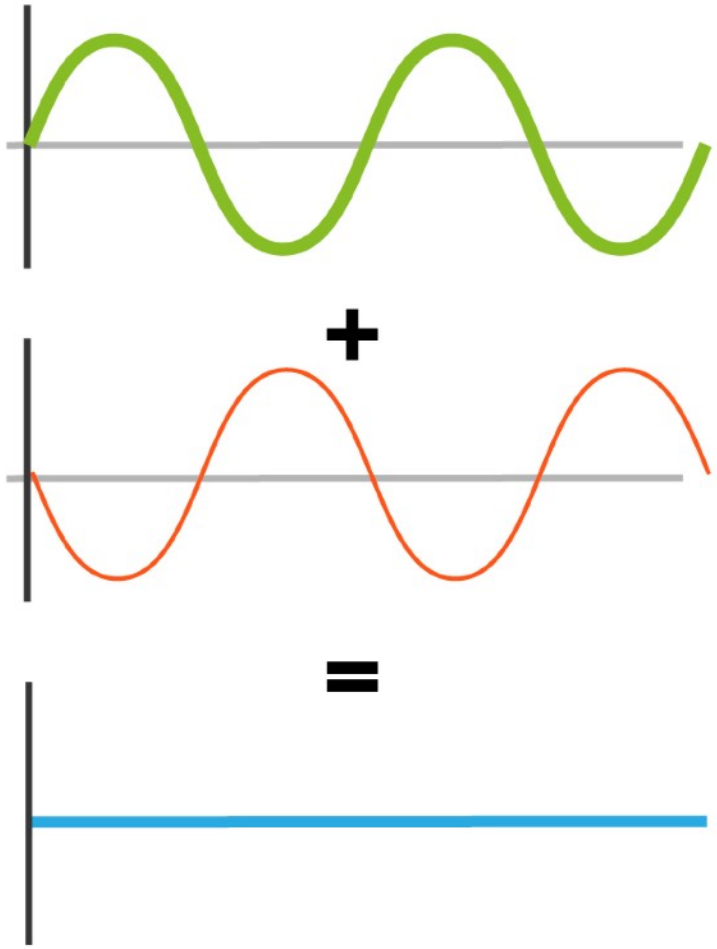
in phase

When two waves of equal amplitude and frequency have identical phases, adding them together results in a wave with the same frequency and phase but **twice the amplitude**.



in antiphase

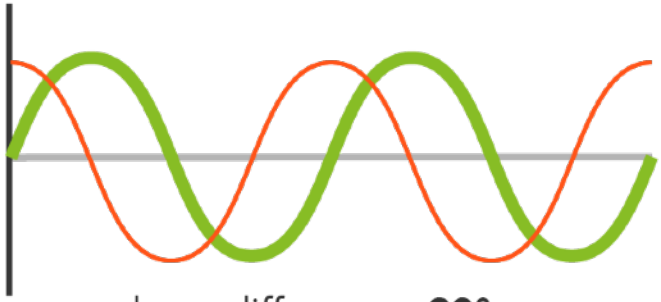
When two waves of equal amplitude and frequency have a phase difference of 180°, “magic” occurs when we add them together.
The result is **silence**, where all values of the resultant wave is zero.



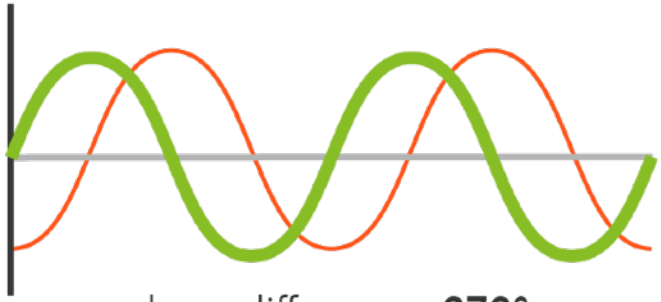
out-of-phase

The term out of phase applies to all other cases when the phase difference between the two waves is between 0° and 180°.

The resultant wave you get when you sum these two waves depends on how close the two initial waves are to being in phase or having an antiphase relationship.



phase difference: **90°**

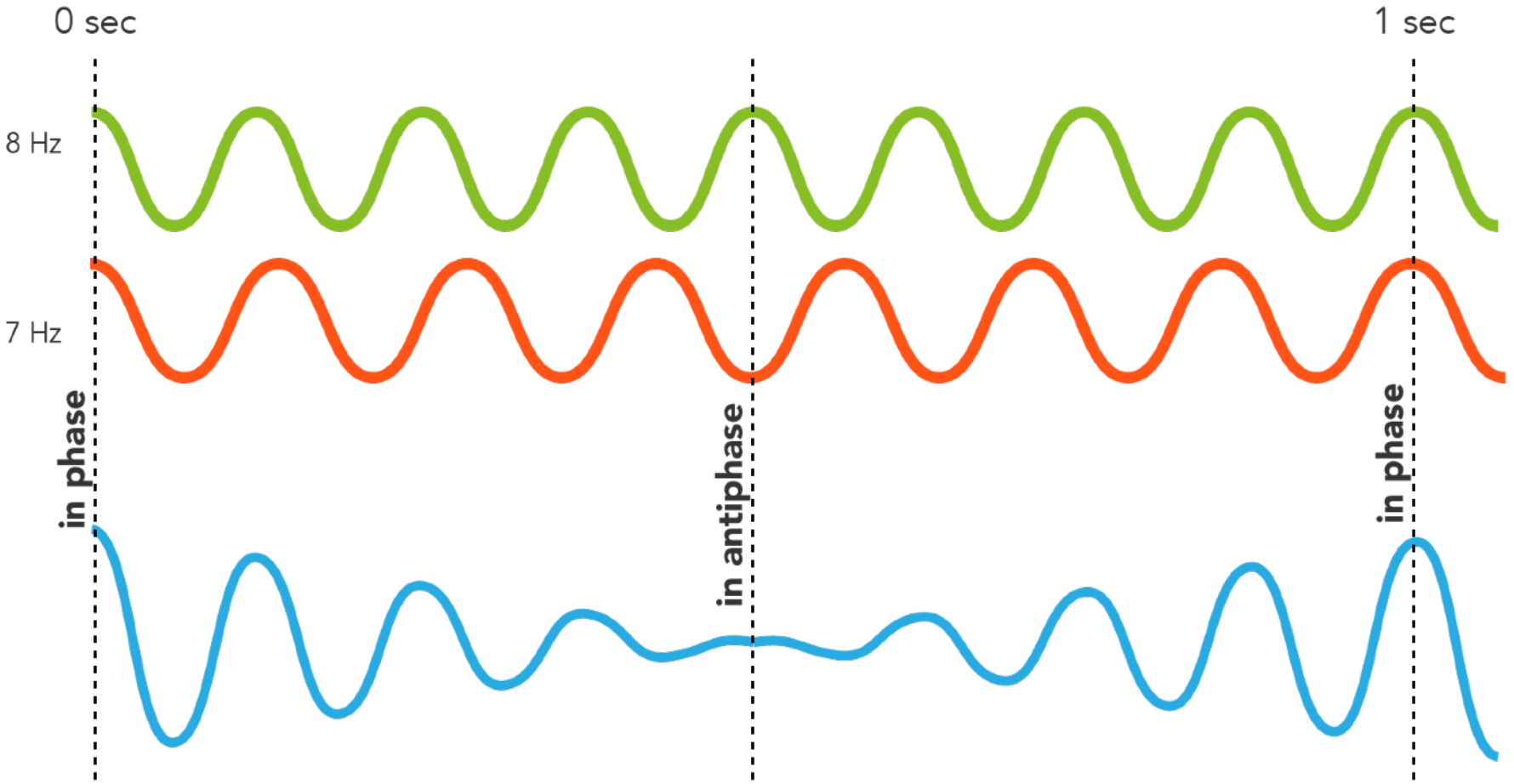


phase difference: **270°**

Beats

Beats frequency
= number of pulses per second
= **freq1 - freq2**

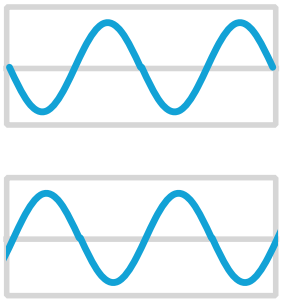
B**eats** are a phase-related physical phenomena that occur when two waves with **equal amplitudes and very close** but not equal frequencies **are added together.**



Balanced connection

A balanced connection is a method of preserving the audio signal because balanced connections reverse the polarity of one of the wires within the cable (i.e., the wire associated with pin 3 of an XLR cable). This effectively cancels out the shared noise carried within the cable. The audio signal is preserved while the noise is silenced and cancelled out due to the superposition of two noise profiles of opposite polarity.

It’s possible due to
polarity inversion

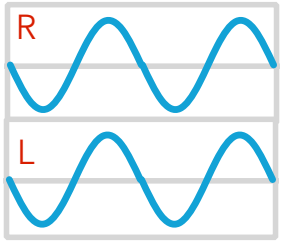


Delete the center sounds on a stereo song

Thanks to anti phase addition, it is possible, for example, to eliminate the voice of a song if it was originally positioned in the center of a stereo mix.

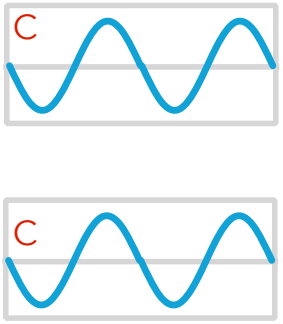
1) divide the stereo signal into 2 mono signals
2) position the two central mono
3) invert the phase of one of the two signals
4) sum the two signals

Original track



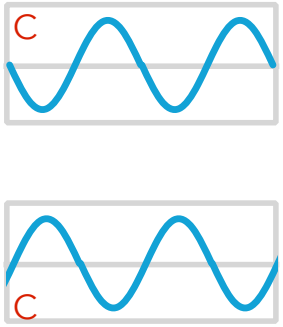
1) 2)

Divide in 2 mono



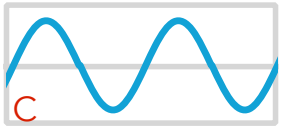
3)

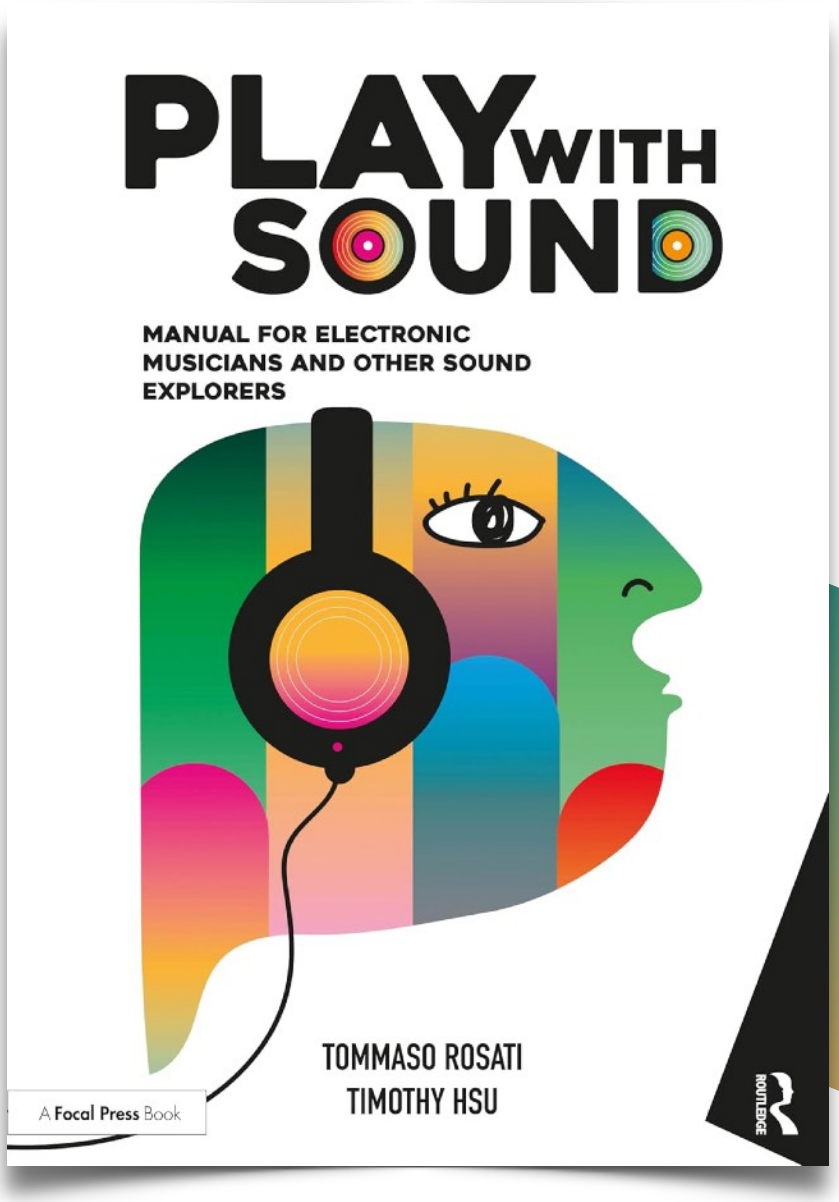
Invert the phase of one



4)

Sum the 2 signals





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