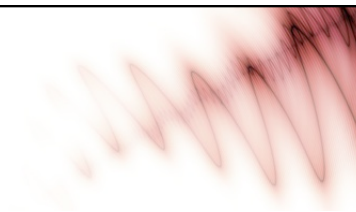


# INTRODUCTION TO COMPUTER MUSIC ACOUSTICS AND PERCEPTION

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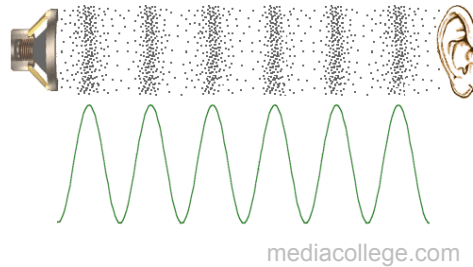
# ACOUSTICS AND PERCEPTION

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## Acoustics and Perception

- Sound is vibration, air pressure fluctuations
  - About 0.001 lbs/in<sup>2</sup> for loud sound
  - Sea level: 14.7 psi
  - Cabin pressure: ~11.5 psi
  - Amplitude of deflection of eardrum = diameter of hydrogen atom for softest sounds
  - 1 psi  $\cong$  6895 Pascal (Pa)



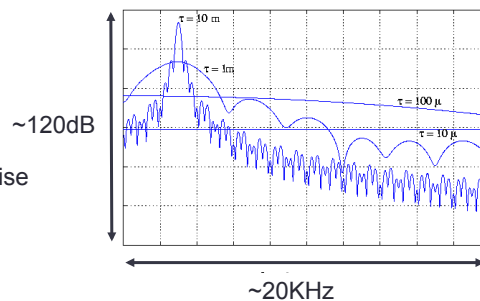
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3

## Acoustics and Perception

- What can we hear?
  - 20 to 20KHz frequency range (nominal)
  - ~120dB from threshold of hearing to threshold of pain
  - Practical range is often determined by background noise
- We are very sensitive to amplitude spectrum



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4

## Real World Sounds are Complex

- Noisy sounds (“shhhh”) are
  - Broadband (all frequencies)
  - Random
- Percussion sounds
  - Thump, bell clang, ping, knock
  - exponentially decaying sinusoids
- Pitched sounds (tones)
  - Tend to have harmonically related sinusoids
  - Driven oscillation: harmonic and sustained
  - Non-driven (plucked, struck): less harmonic, exp. decay

