CINEPANEL

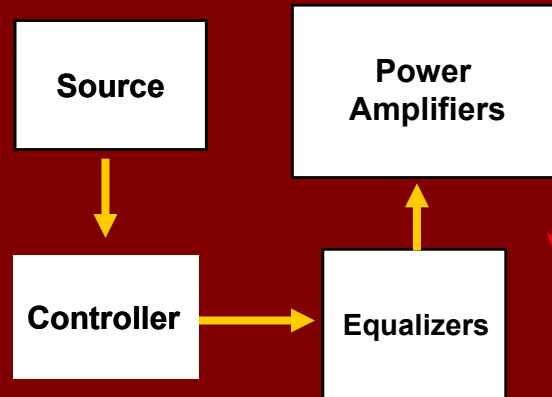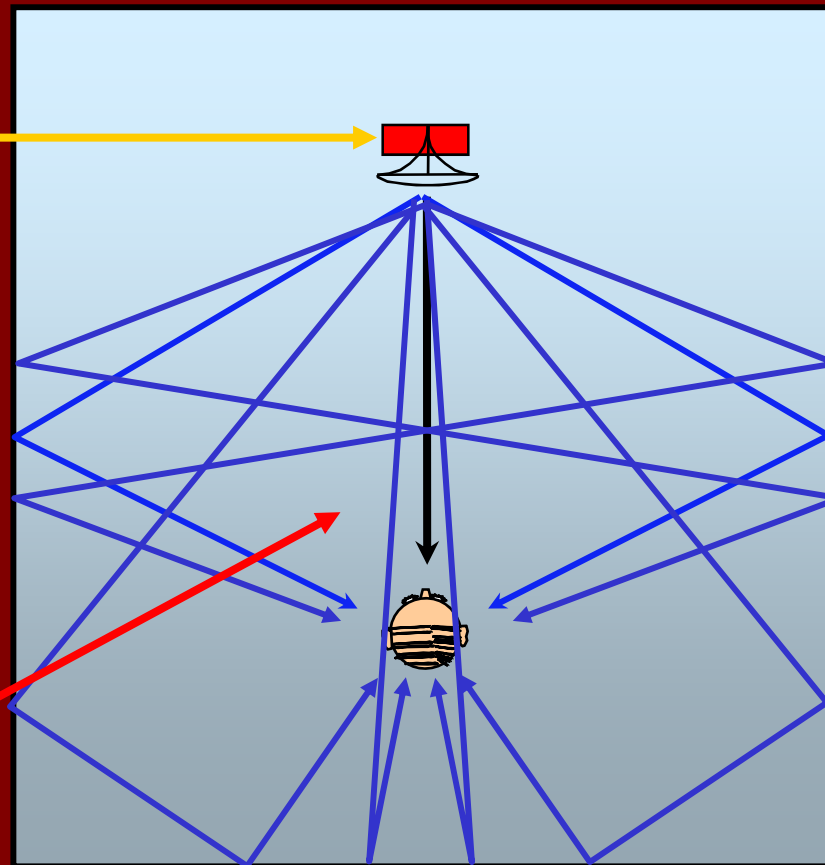# Solutions for Better Sounding Rooms

Introduction

- **Why talk about acoustics?**
    - **Acoustics are audible!**
    - **Contribute to over 50% of quality**
    - **Acoustics are fixable**

The Acoustic Interface

Source

Power Amplifiers

Controller

Equalizers

- **Electronics Interface is under control**
- **Take control of acoustic interface**

PMI

What's Acoustics?

- ## It's about the speaker/room/listener interface

- ## It's the final frontier!
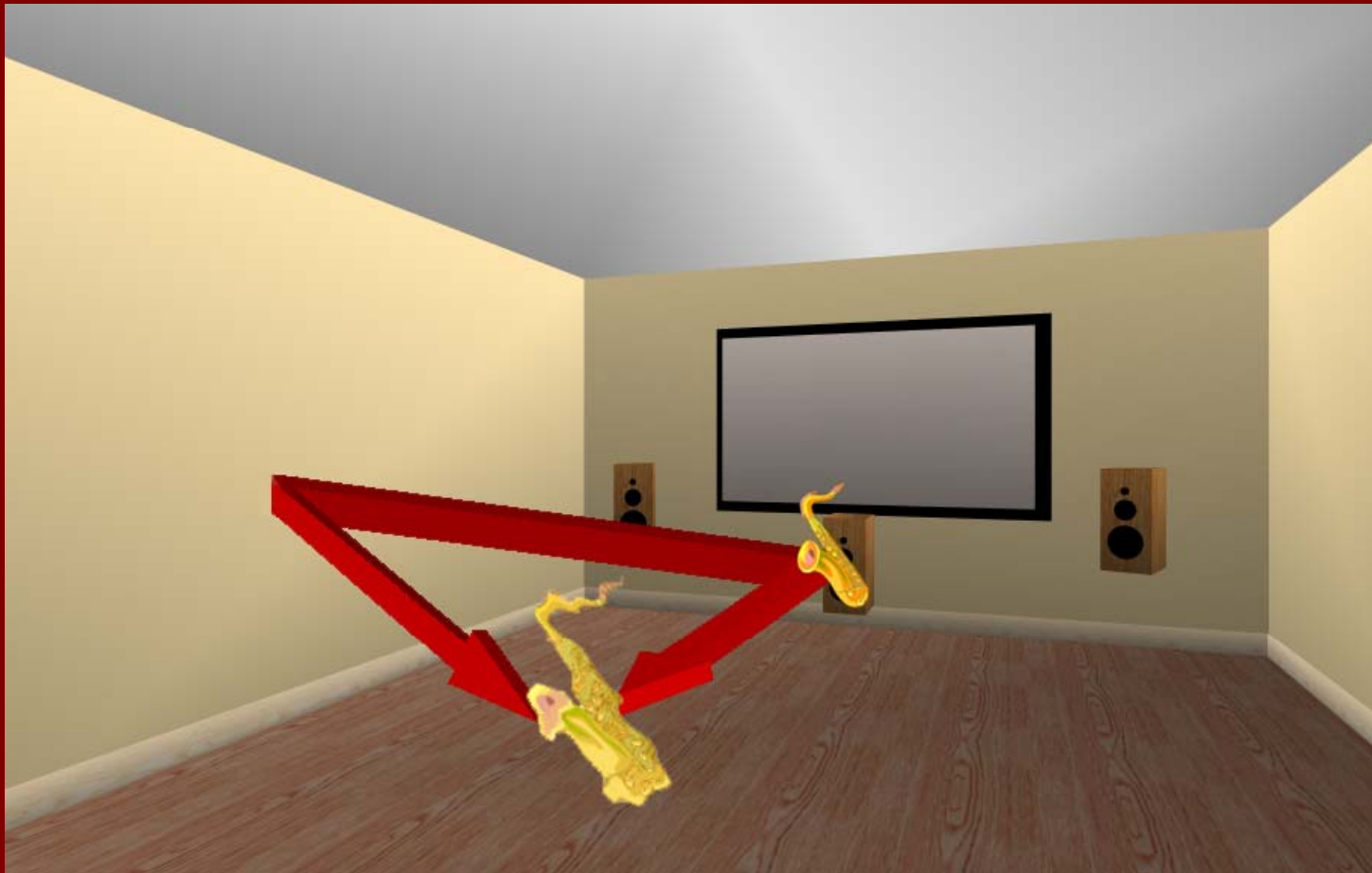
PMI

Enhancements from Acoustic Treatments

- **Clear dialog**
- **Precise sound localization**
- **Spacious surround**
- **Smooth sound movement**
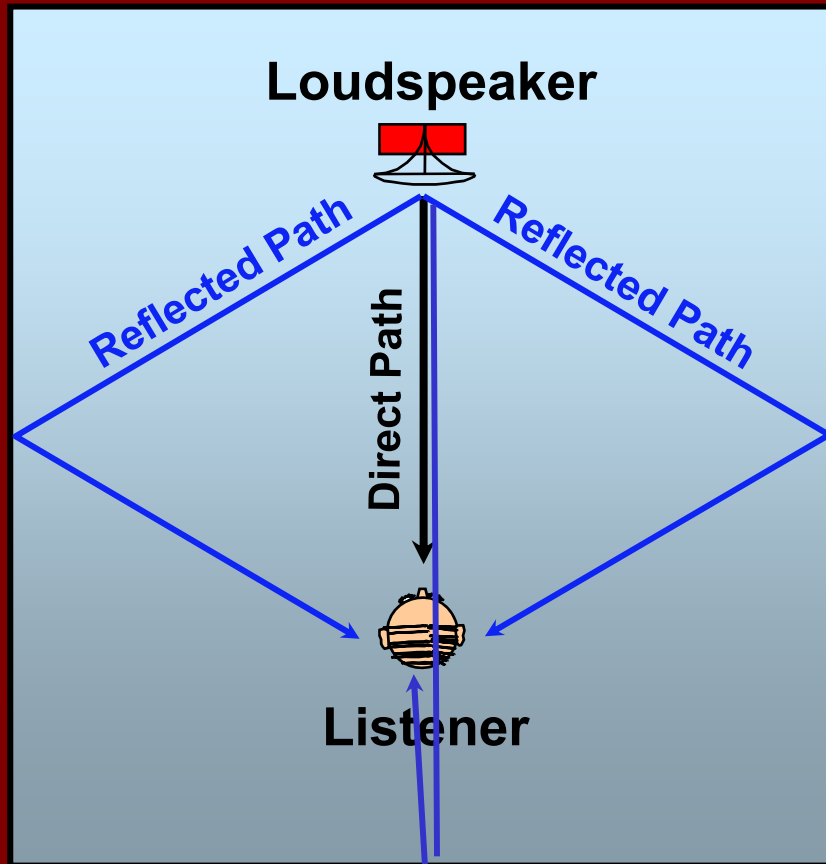- **Even tonal balance**
- **Every seat a good seat**

PMI

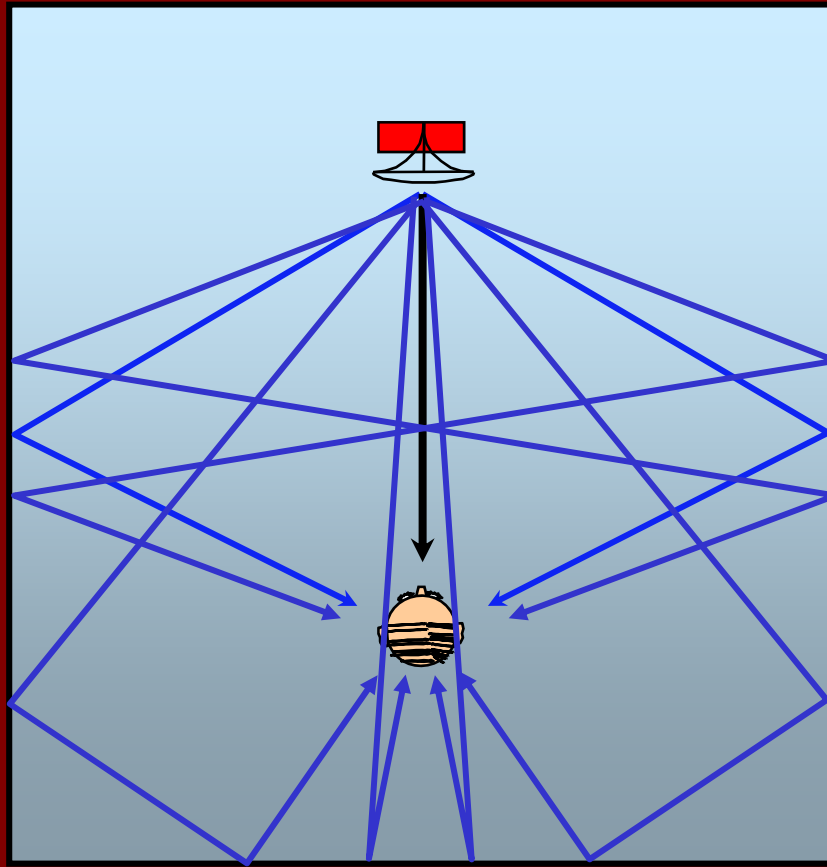# Room Reflections

Reflections = Distortion

Room Reflections

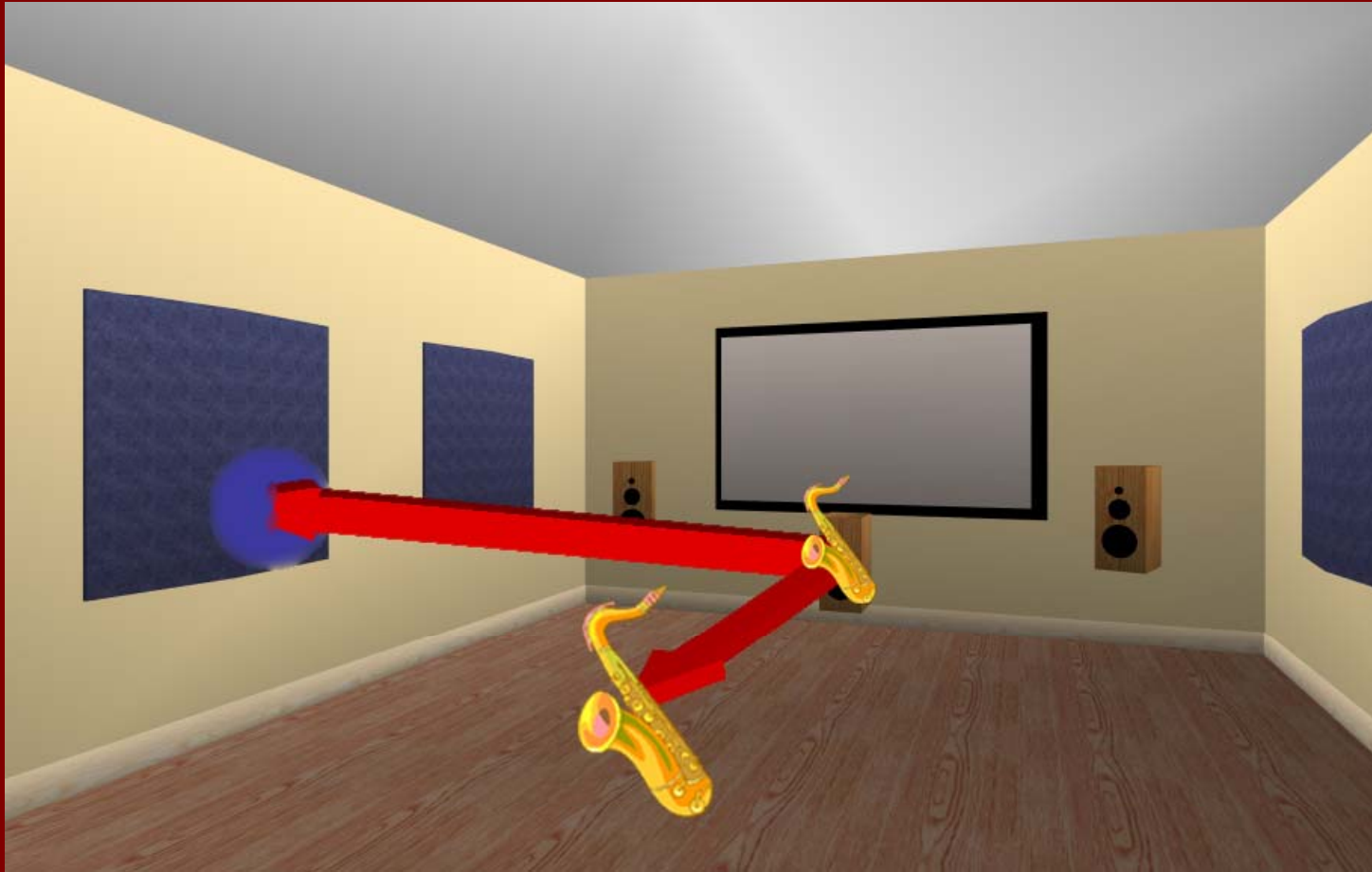- **Sound reflections degrade sound quality and sound staging**

Room Reflections
Did you Know?!

- **At main seat you listen to more reflected sound than direct!**

- **The room plays an important part in the sound you hear**

- **Acoustic treatments take control of reflected sounds**
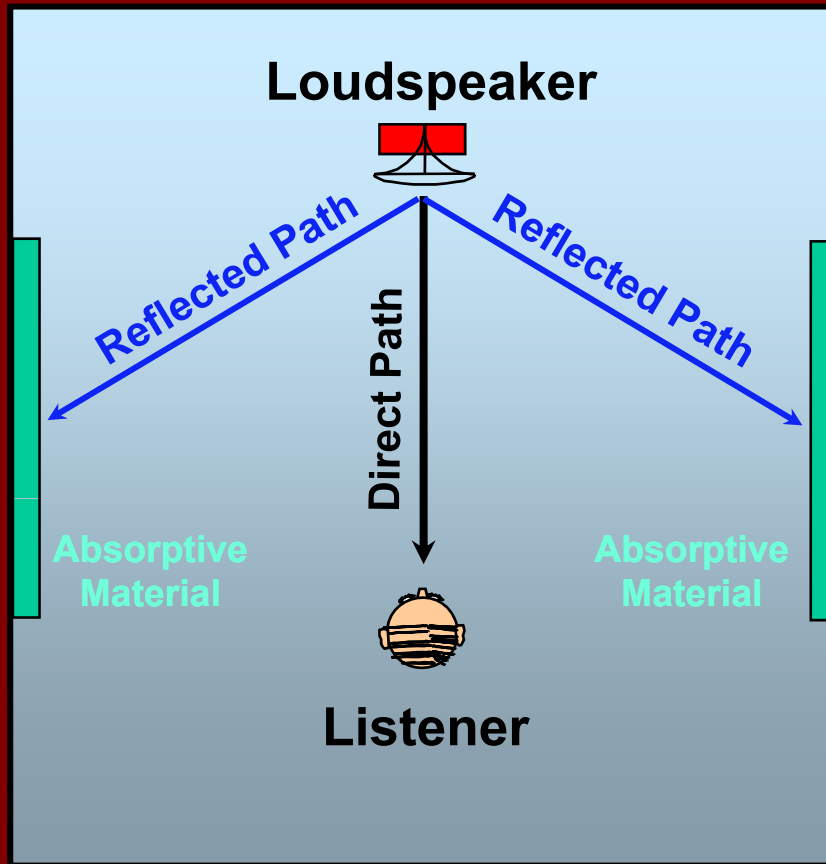
PMI

Solutions to Room Reflections
Absorption

PMI

Solutions to Room Reflections Absorption

- **Absorptive materials**
  - **CinePanel Absorber**

Acoustical Treatments
Absorption Thickness

- **1" Panels work down to 1kHz**
- **2" Panels work down to 500Hz (better)**
- **4" CinePanel works down to 250Hz (best)**

Absorption vs Frequency graph showing 4", 2", and 1" panel curves at 250Hz, 500Hz, 1kHz, and Frequency.

PMI
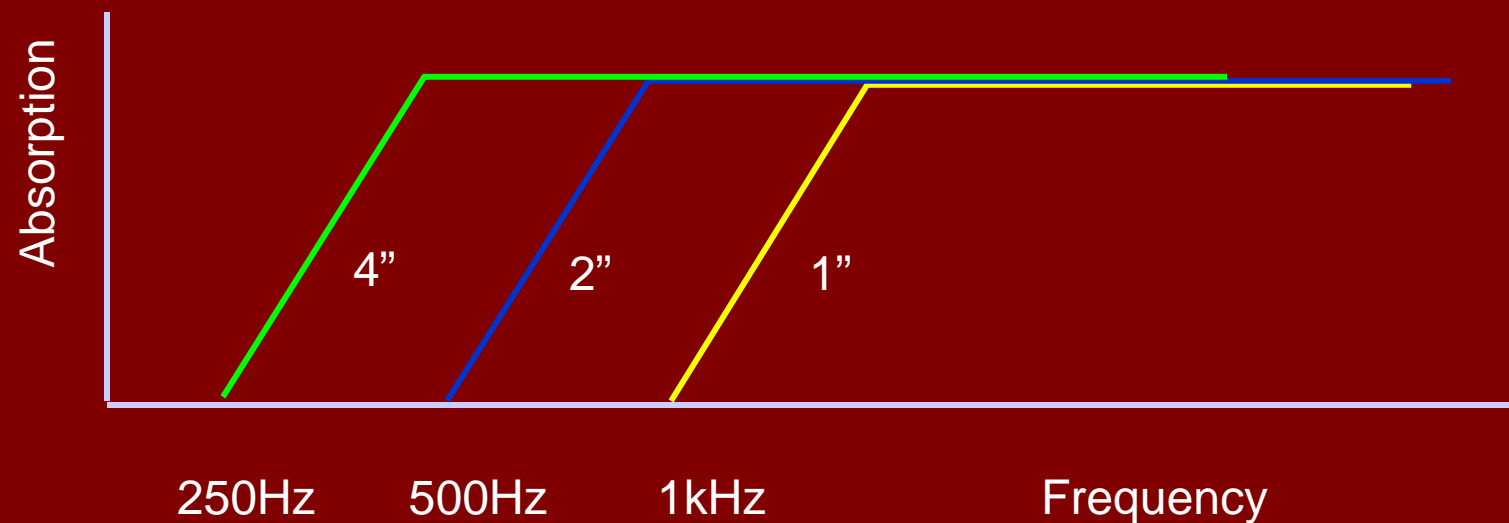
Solutions to Room Reflections
Diffusion
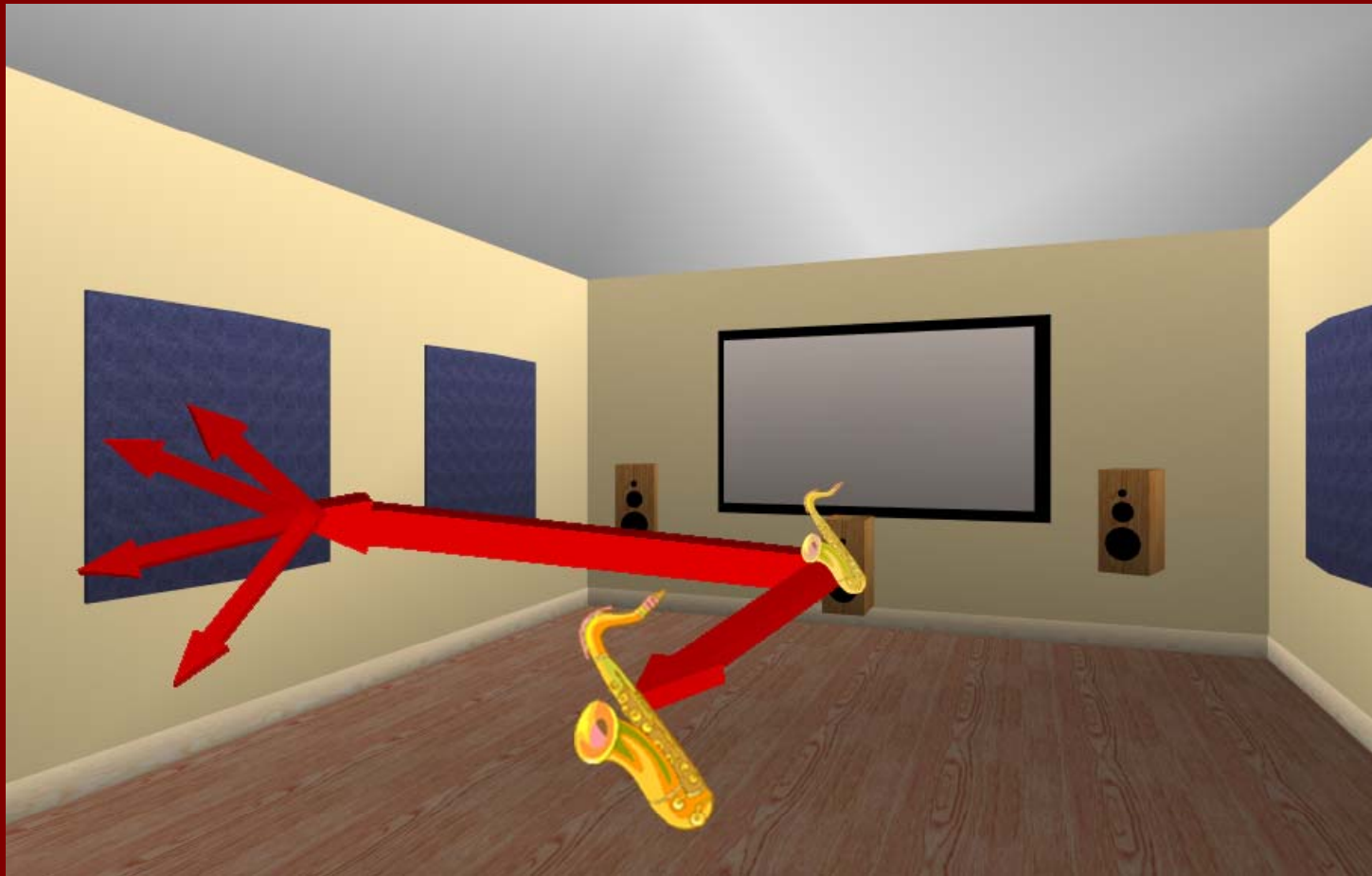
Solutions to Room Reflections
Diffusion

- **Diffusive materials**
  - **CinePanel diffusers**

Acoustical Treatments
Diffusion

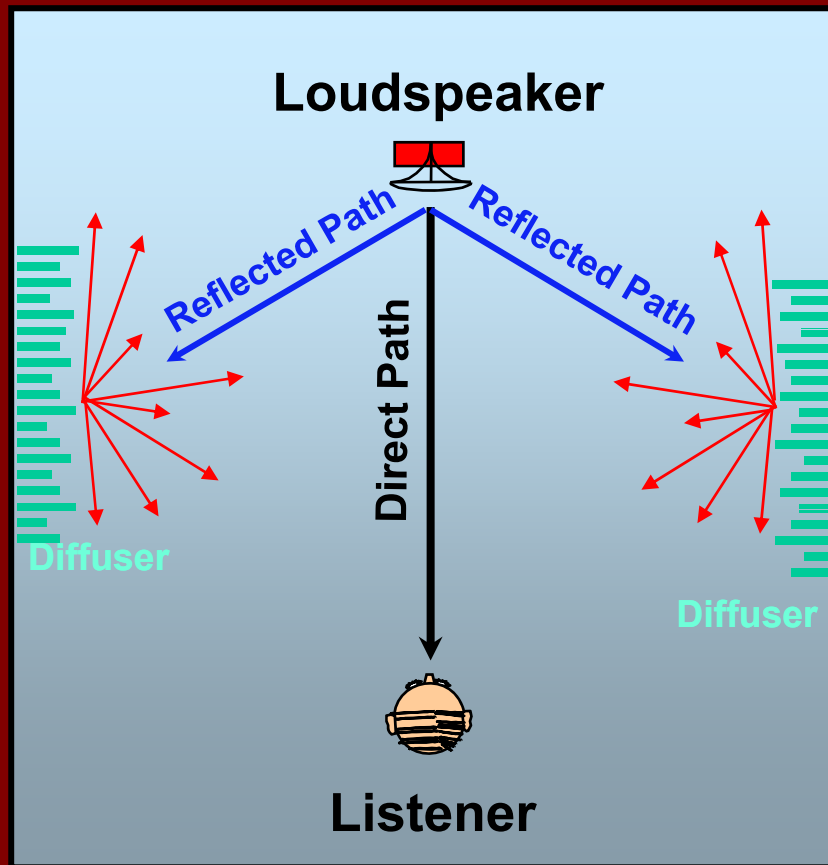- **Balance diffusion and absorption**

- **Keep some liveness to the room**

- **Need enough diffusion surface to "smooth out" the soundfield**

PMI

Flutter Echoes

Flutter Echoes

Loudspeaker

Listener
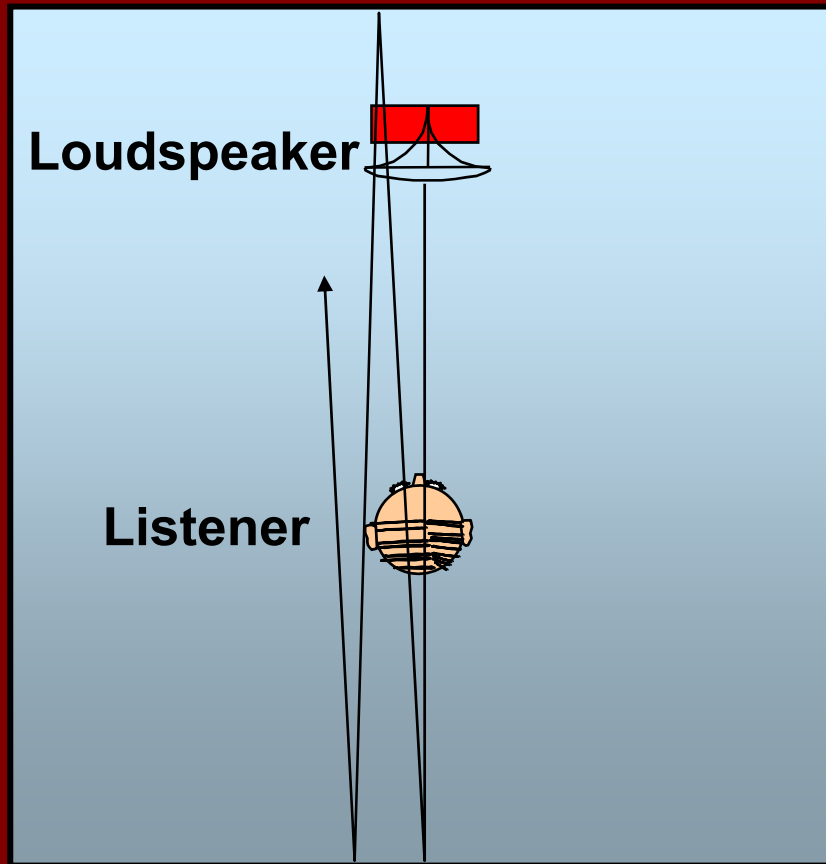
- **Echoes are**
  - **Repeated reflections between two parallel surfaces**

- **Slap echoes cause**
  - **Degradation of soundtrack clarity and soundstaging**
  - **Bright, "zingy" sound**

PMI

Solutions to Echoes
Materials

Absorptive Material

Loudspeaker

Listener
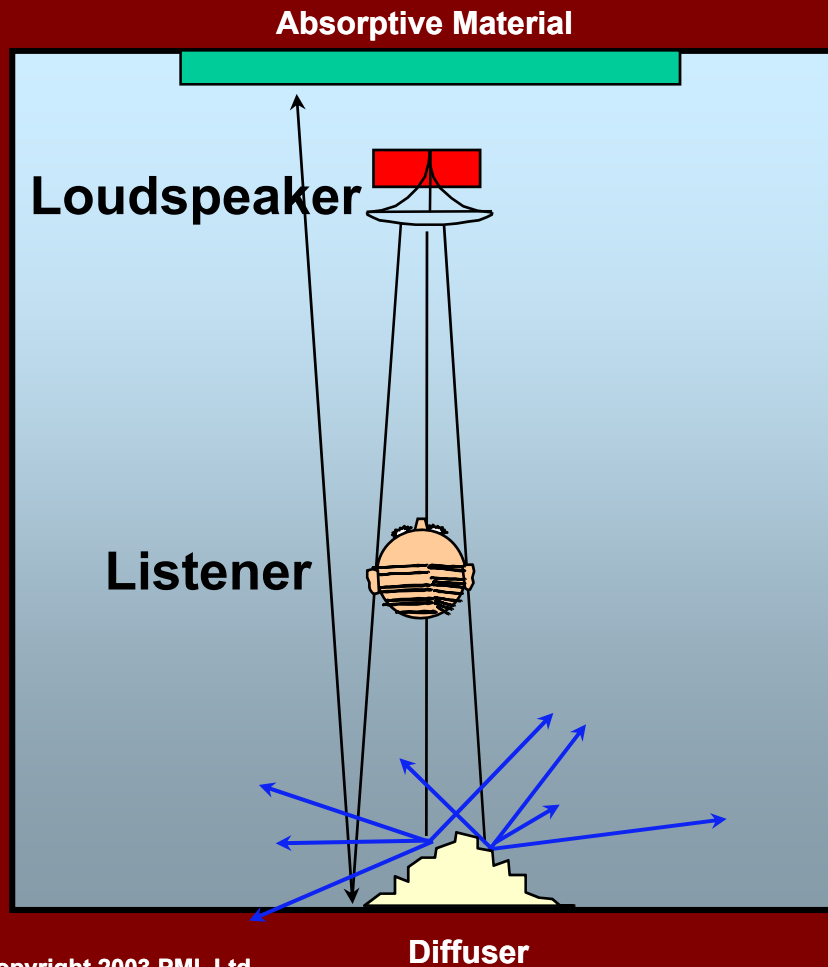
Diffuser

- **Absorptive**
  - CinePanel Absorbers
- **Diffusive**
  - CinePanel Diffusers

PMI

Reverberation

"Early Decay"

Reverberation
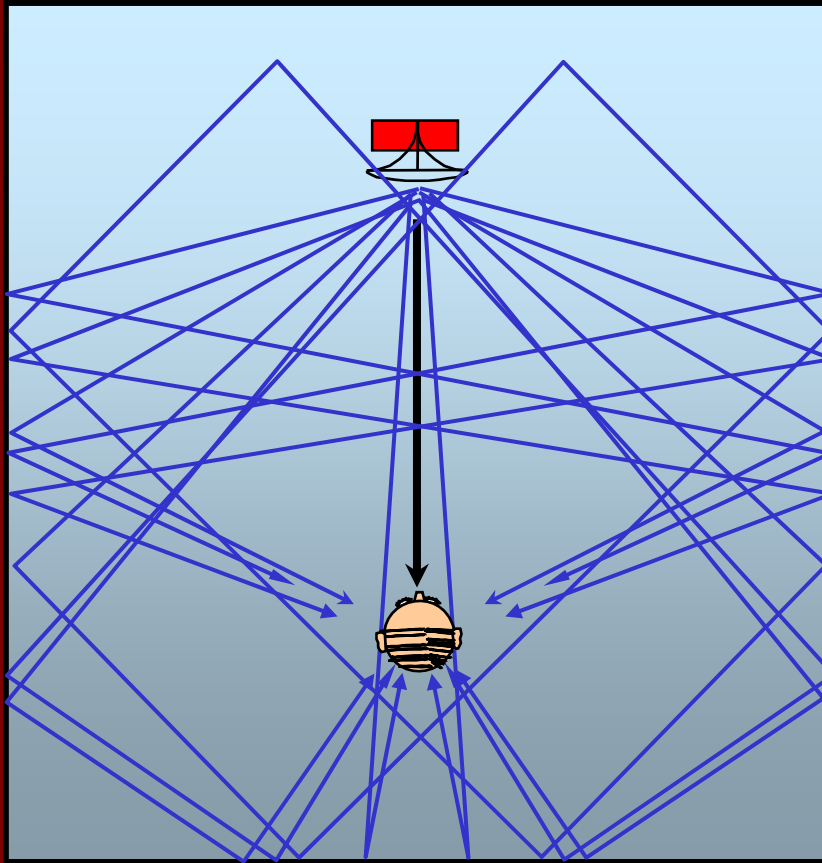
- **Reverberation is the result of multiple reflections**
- **Reverb level and time length have to be just right**

PMI

Reverberation Guidelines

- **Research shows that most people like the same range of reverb time**
- **Decay time should be .2 to .4 seconds**
- $T_m = 0.3 (V/3532)^{1/3} \pm 15\%$ **where V=room volume in ft^3**

PMI

Reverberation Time

Optimal Decay Time vs. Room Volume

RT60 Time (vertical axis)

- 0.31s
- 0.28s
- 0.25s

Volume (ft^3): 2000, 3000, 4000
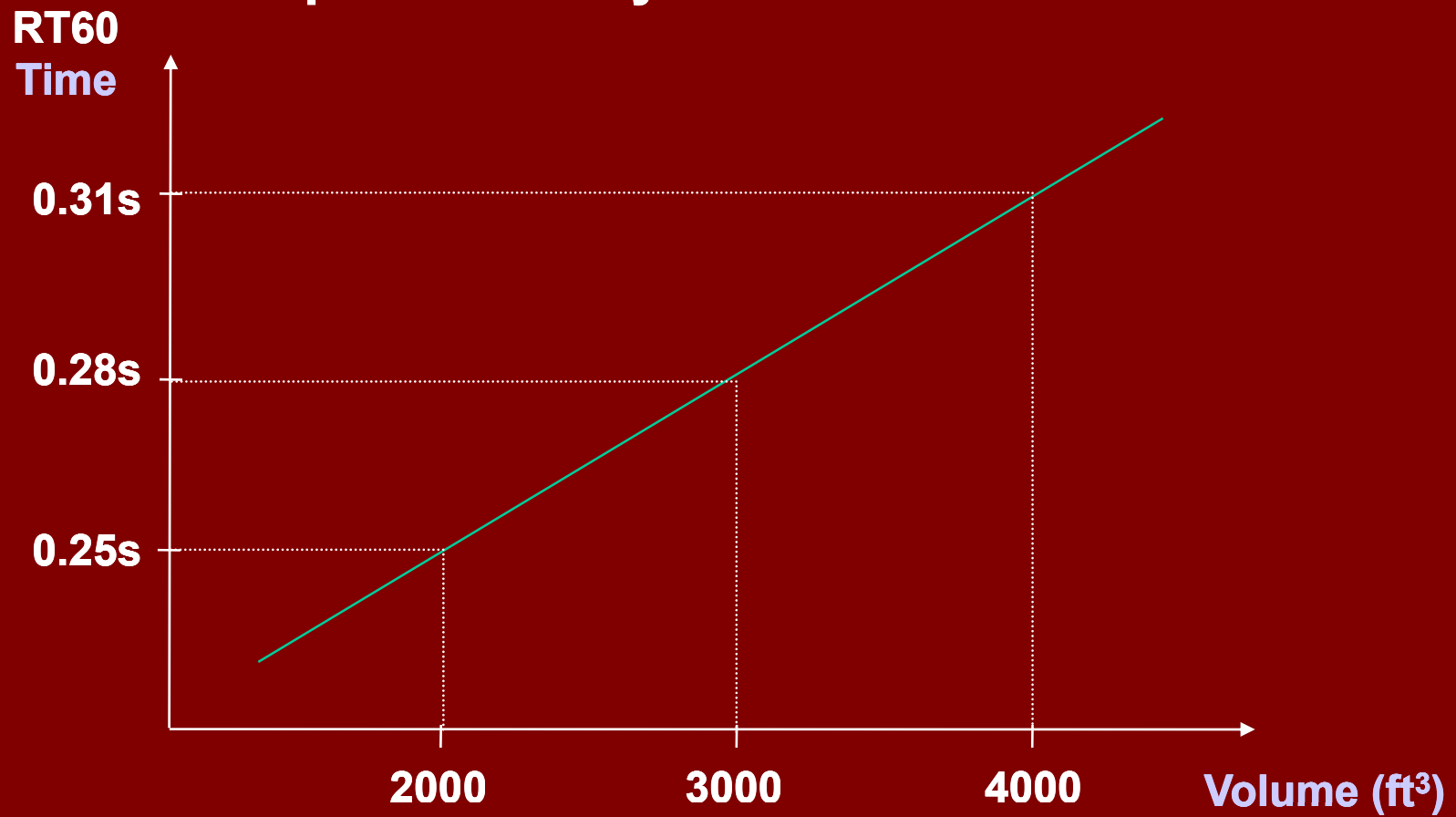
Reverberation Time
Getting it right

- **Use the right amount of absorption**

- **Calculate the amount with the Arau-Puchades equations**

  - **Know the absorption coefficient of materials**

  - **Be prepared to do lots of math**

PMI

Reverberation Time
Getting it right – Do the Math

- **The Arau- Puchades equation: Best and latest**

$$RT60 = \left[\frac{0.161V}{-S\ln(1-\overline{\alpha}_x)}\right]^{x/s} \times \left[\frac{0.161V}{-S\ln(1-\overline{\alpha}_y)}\right]^{y/s} \times \left[\frac{0.161V}{-S\ln(1-\overline{\alpha}_z)}\right]^{z/s}$$

V is volume

S is total room surface area

α is area-weighted averaged absorption coefficient for each wall

x is area of Left +Right walls

y is area of Front + Rear walls

z is area of Floor + Ceiling

PMI

Reverberation Time
Getting it right

- **… or simply use the CinePanel room size guidelines**
  - **We've already done the work for you!**

PMI

CinePanel Kit Selections
Optimized decay time for each room size

Room Size	Kit	Absorbers	Diffusers
180 ft^2	CP55	5	5
200 ft^2	CP66	6	6
300 ft^2	CP77	7	7
400 ft^2	CP88	8	8
500 ft^2	CP99	9	9
600 ft^2	CP1010	10	10

PMI

Example Layout

Example Treatment Layout
CinePanel CP88P in 400 ft² room

Door with absorber panel

2x4' Absorptive panel on ceiling

Optional absorptive panel behind Microperf screen
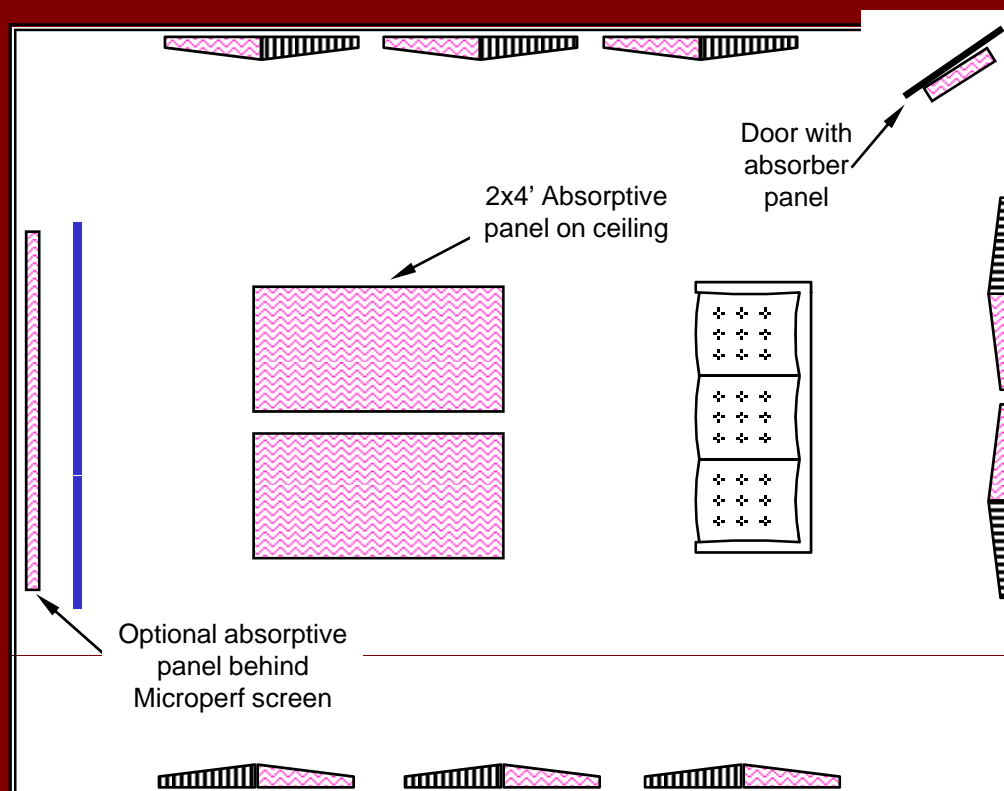
CinePanel Diffuser

CinePanel Absorber

Asymmetrical placements prevent Flutter Echoes between diffusers
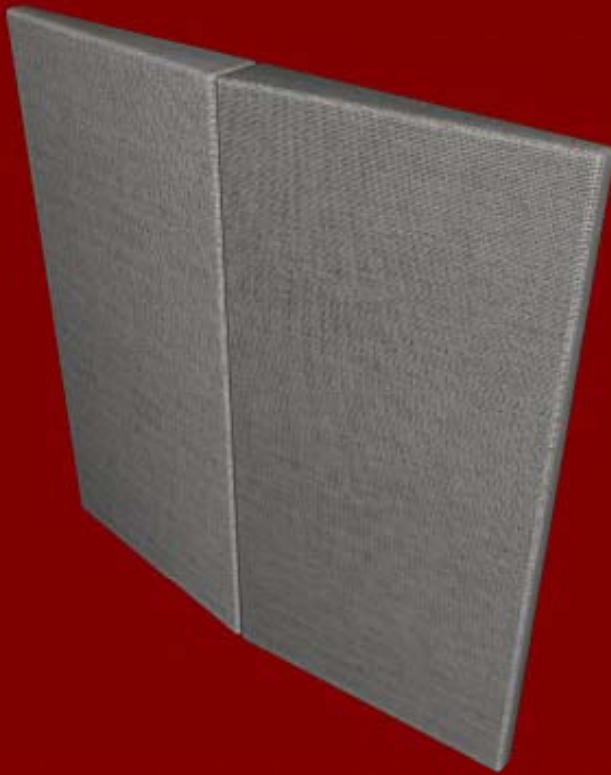
PMI

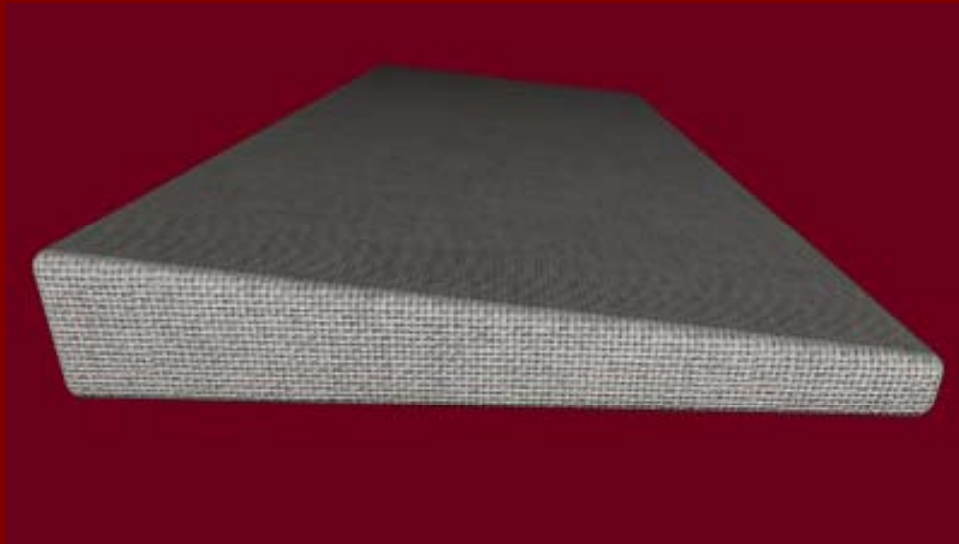# CinePanel®
The Product Line

The CinePanel Building Block

- **Absorber-Diffuser panel pair**
- **Each panel is 2'x4'**

PMI

The CinePanel Building Block

- **Wedge-shaped panels**
- **Taper from 2" to 4½ "**
- **Benefit: wider response without the visual bulk**

PMI

The CinePanel Building Block

- **Absorber and diffuser Panels look identical**
- **Cores are different**
- **Absorber is dense mineral wool in fiberglass sheath**

PMI

The CinePanel Diffuser

- **Linear wells**
- **Different depths for broader frequency range**
- **Low resonance Polyethylene**

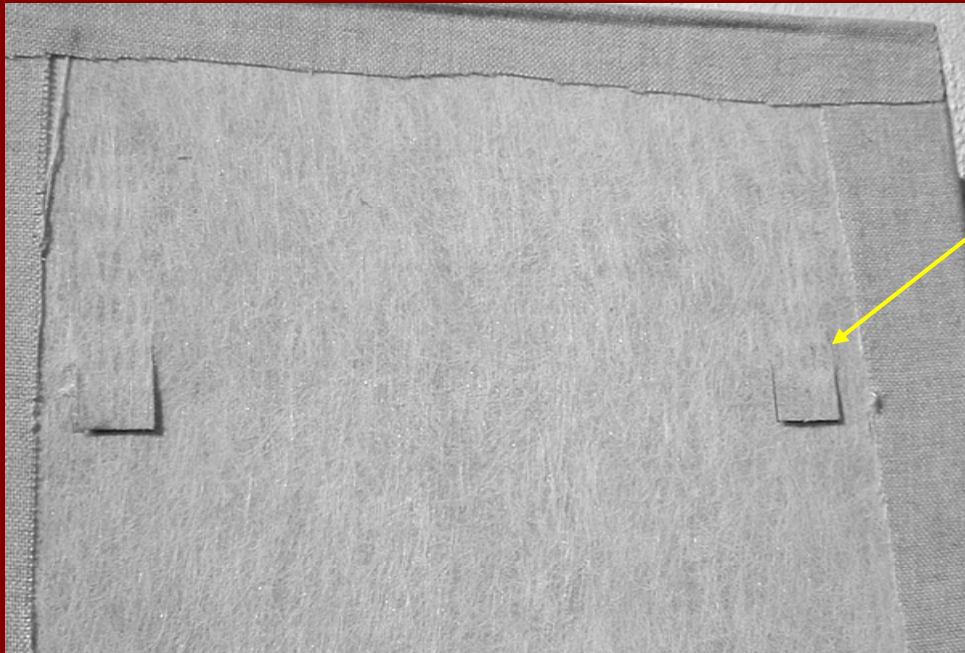PMI

Fabric Color Choices

- **Guilford FR701 Fabric**
- **48 Color choices**

Installation
Clips for Diffusers

- **Clips**
- **V-Bar affixed to wall**

PMI

Installation
Clips for Absorbers

- Z-Clips
- V-Bar affixed to wall

PMI

Installation

fig. 4
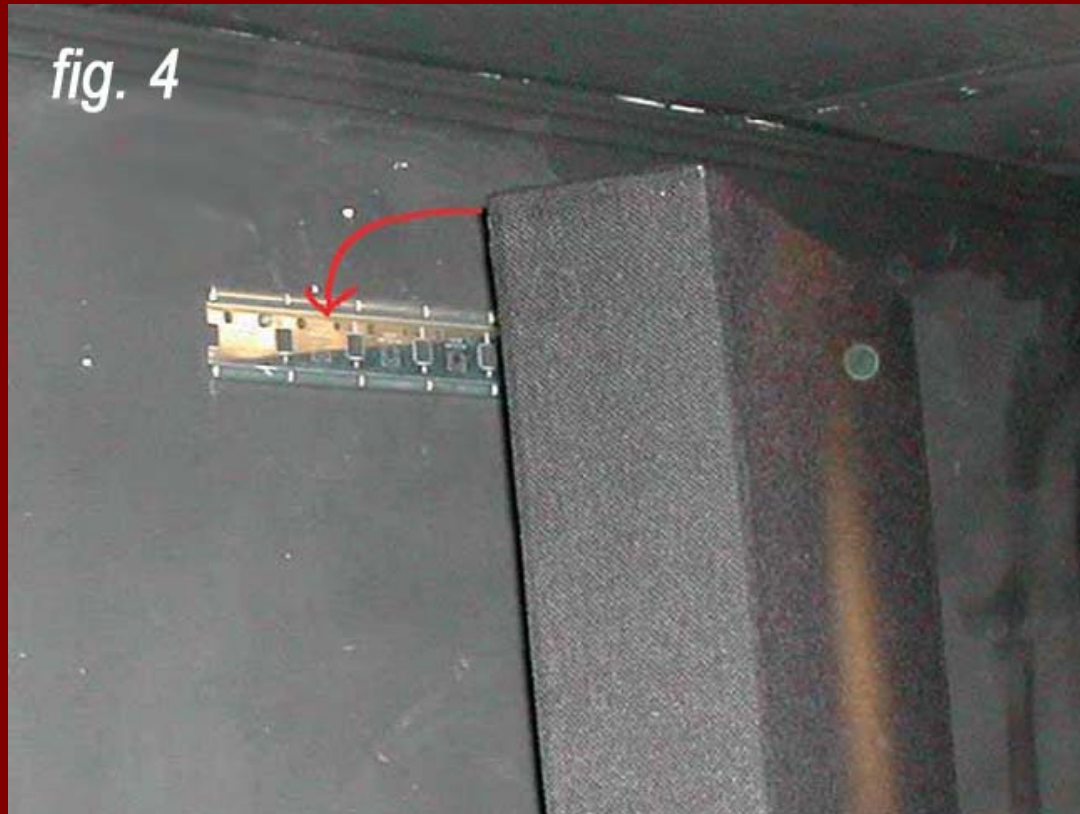
- **Panel hangs from clip bar**
- **Easy to install and remove**

PMI

Installation
Hanging the Panels

- **Place absorbers and diffusers 2 ft up from floor**
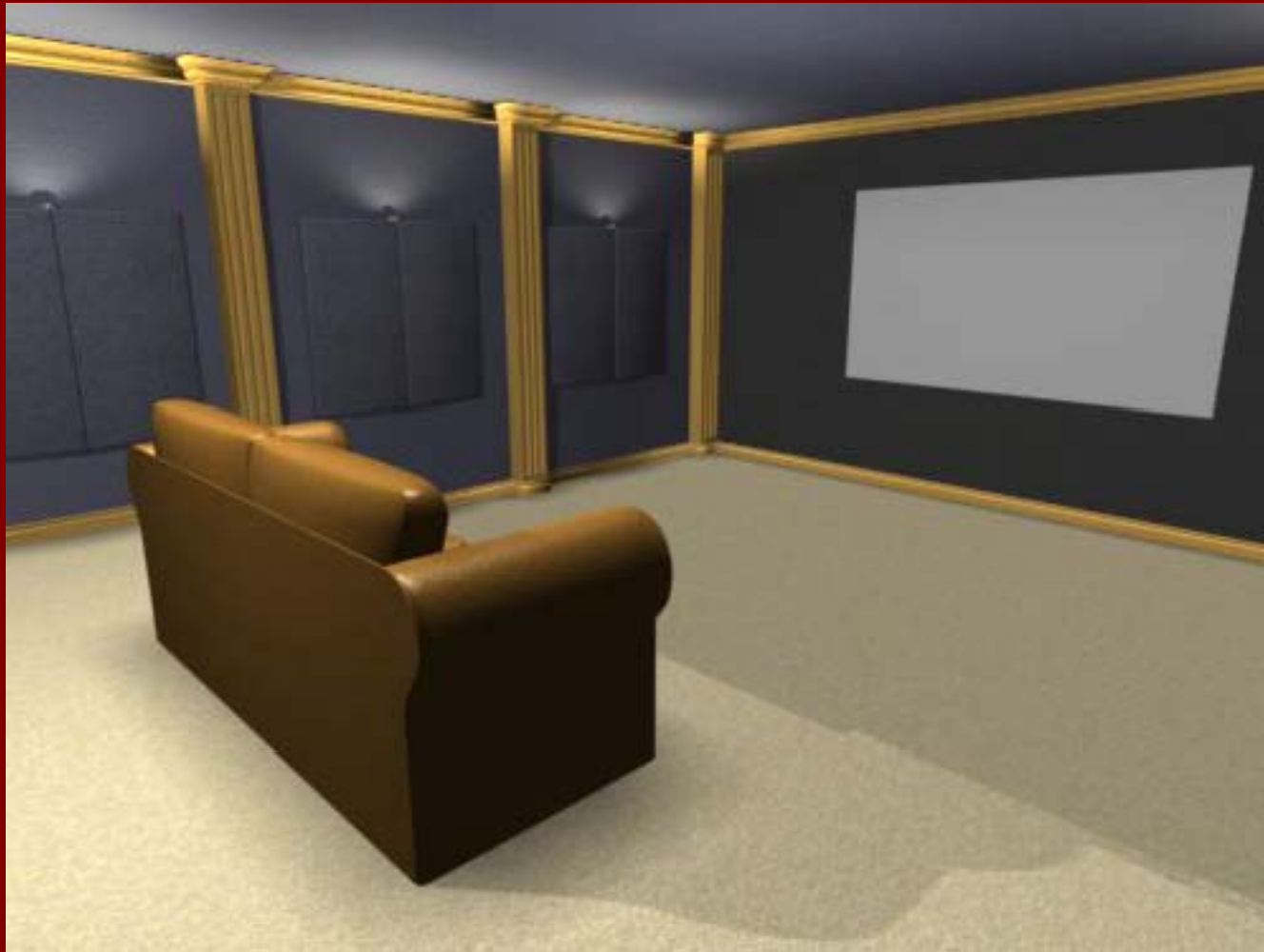
Lighting Option

- **Place low voltage halogens on top of panel pair**

- **Increases architectural function**

PMI

CinePanel Room in Gray

CinePanel Room in Blue

CinePanel Room in Red

CinePanel Kit Prices

Room Size	Kit		Retail
<180 ft^2	CP22		$1300
180 ft^2	CP55		$3,200
200 ft^2	CP66		$3,700
300 ft^2	CP77		$4,300
400 ft^2	CP88		$4,800
500 ft^2	CP99		$5,500
600 ft^2	CP1010		$6,100

PMI

CinePanel "Plus" Kit Prices

Room Size	Kit		Retail
<180 ft^2	CP22P		$1,600
180 ft^2	CP55P		$3,500
200 ft^2	CP66P		$4,100
300 ft^2	CP77P		$4,600
400 ft^2	CP88P		$5,500
500 ft^2	CP99P		$6,200
600 ft^2	CP1010P		$6,800

PMI

CinePanel Press Coverage

- ## Phenomenal !
- **Home Theater Nov 2002**
- **Home Theater May 2003**
- **Sound and Vision May 2003, page 26**
- **Widescreen Review Issue 70, Page 25**
- **Cinema Chez Soi (France) November 2002**
- **Inside Track, Aug 28, 2003**

PMI

Summary

- **Room acoustics affect any audio system**

- **With basic science and care you can tame room acoustics**

- **CinePanel is the simple answer!**

PMI