One example of such panels is a rotatable panel, flat on one side with absorptive material, the other side being convex in shape and treated *e.g.* with hardboard, to make it reflective. The reverberation time of the room is increased (decreased) by rotating the reflective (absorptive) side out – *i.e.* towards the inside of the room.

Control of the axial/tangential/oblique room mode resonances and scattering reflections is critical in a recording studio, far more so than for home listening rooms/home theaters, via use of strategically placed sound diffusers (note the phase-grating diffuser and other sound absorbing panels on the walls of the recording studio in the above photo). In order to suppress flutter echoes (rapid-fire echoes associated primarily with axial modes between parallel opposing hard walls, with periodicity $T = L/v$, originating from transient/impulse-type/short-duration sounds – *e.g.* hits on a snare drum) and to distribute room resonance frequencies more evenly, recording studios are often consciously built with irregular shaped *vs*. all-parallel walls (note the irregular ceiling and sound diffusers in the above photo).

As mentioned previously, sound diffuser panels as well as sound absorber panels, traps, *etc*. are used in combination to control reflections and resonances in the recording studio. The optimal placement of sound diffusers and absorbers will depend on the geometrical details of the shape of the recording studio, but again, generally speaking, the optimal placement for bass traps will be along walls/in corners of the room – at the pressure anti-nodes of the low-frequency standing waves of the room.

Another important parameter is the Initial Time Delay (ITD) – which is the time difference between the direct sound and the first reflected sound reaching the recording microphone. The ITD helps determine the intimacy of the music, and which is controlled by the relative placement of (*a*) the musician performer, (*b*) the microphone and (*c*) the surface on which the first sound reflection occurs.

Two additional important factors in recording studio design (and operation) are noise isolation and ambient noise level(s). Ambient noise in the recording studio must be kept as low as humanly possible. It makes no sense to locate a recording studio *e.g.* near a busy train station or heavy industries, so a site environmental noise survey should be done afore hand. Specifications for noise isolation are written that drive the construction details of the studio for walls, doors, windows, and, since rooms require adequate ventilation, and thus HVAC noise levels pose significant design considerations for recording studios.

Sound isolation within the recording studio is often called for. An overall, ensemble-type sound is usually desired for orchestras and choirs, requiring recording microphones to be placed a distance from the musical group so that sounds blend together naturally before reaching the microphones. For soloists and smaller ensembles, the close-miking technique is often used to record the individual performer's sounds, thus requiring mixing in post-recording production. In such situations, it is (highly) undesirable for the sound of one performer to be picked up by the microphone of another. The so-called *rule-of-three* is often used to ensure that the distance of one musician to any other microphone is at least 3× the distance to his/her own microphone, in order to suppress unwanted so-called "comb-filtering" frequency-dependent constructive/ destructive interference effects, as shown in the figure below:

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