CARL VON OSSIETZKY universität OLDENBURG

Welcome to the RAZR workshop!

8. 12. 2017

RAZR

RAZR – Room acoustics simulator

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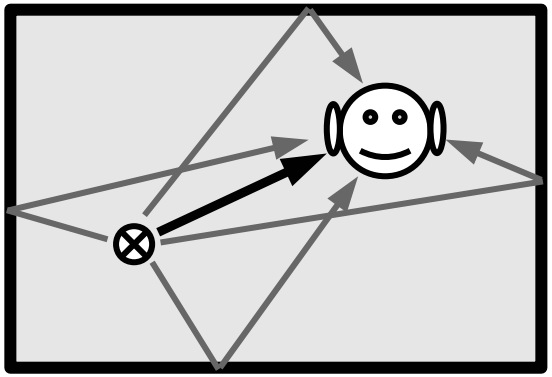
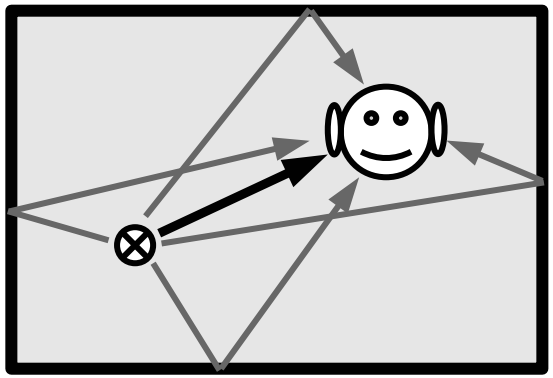
RAZR synthesizes

- Room impulse responses (RIRs)
- Binaural RIRs (BRIRs)
- Multichannel RIRs

Binaural room impulse responses (BRIRs)



Binaural room impulse responses (BRIRs)



Applications

- Psychoacoustic experiments
- Testing sig-proc-algorithms (e.g., for hearing aids)
- »Spatial« Entertainment, computer games
- ...

Use cases

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- [Room geometry + wall properties + HRTF] $\mapsto$ BRIR

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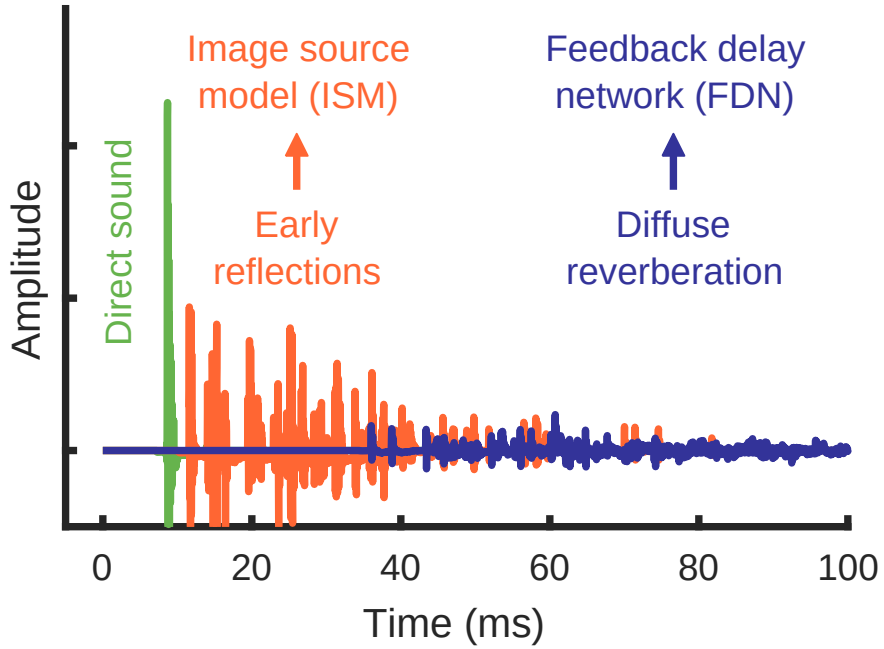
- ...

RAZR – Room acoustics simulator



ISM: Allen and Berkley (1979)
FDN: Jot and Chaigne (1991)
RAZR: Wendt et al. (2014)

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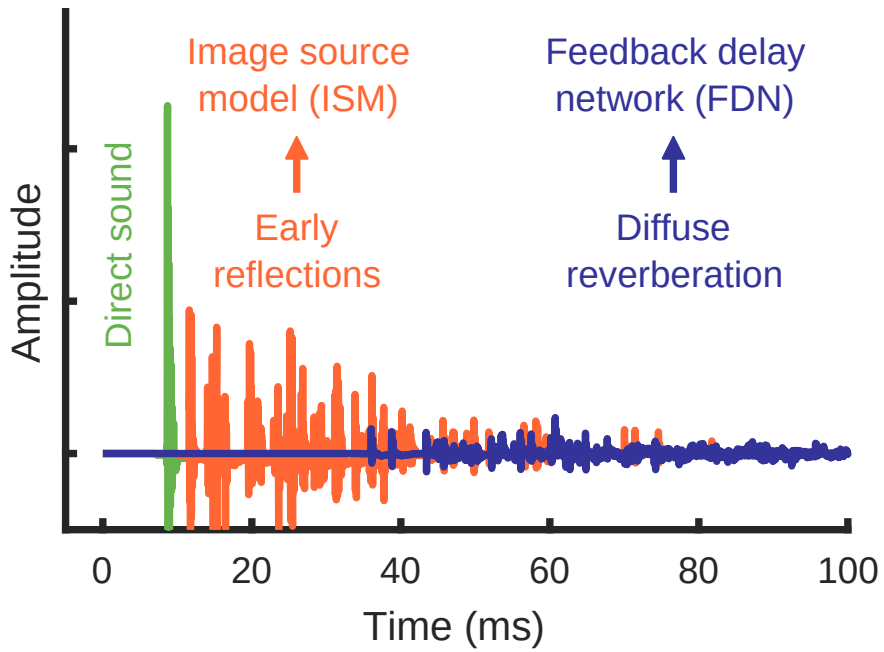

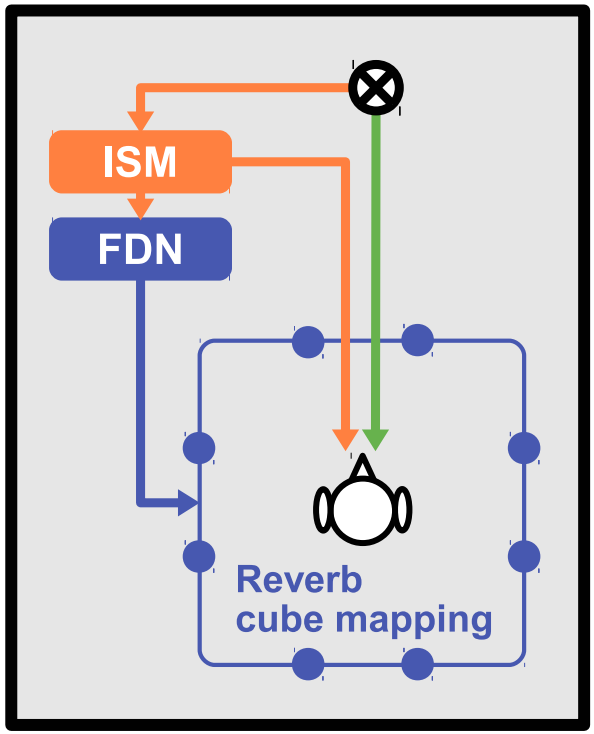

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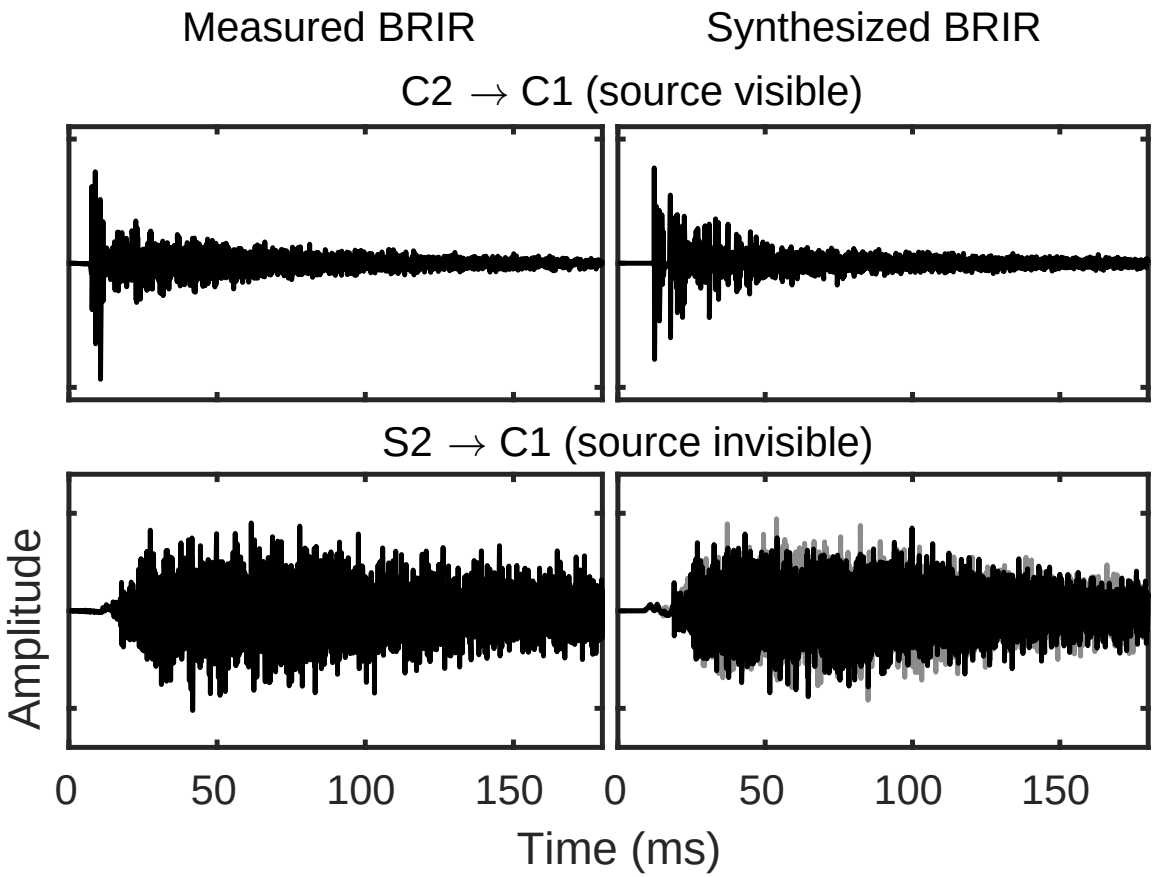
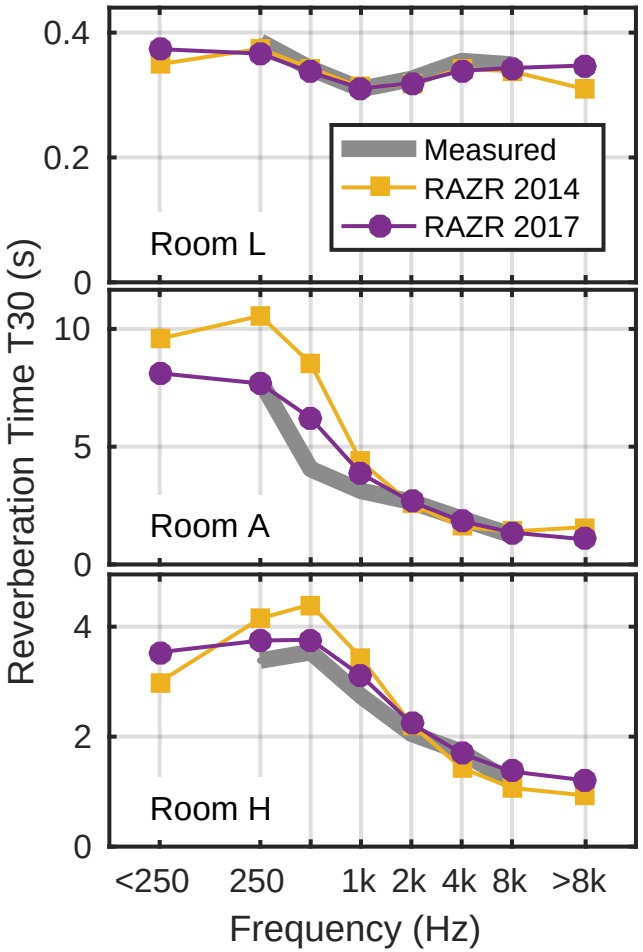
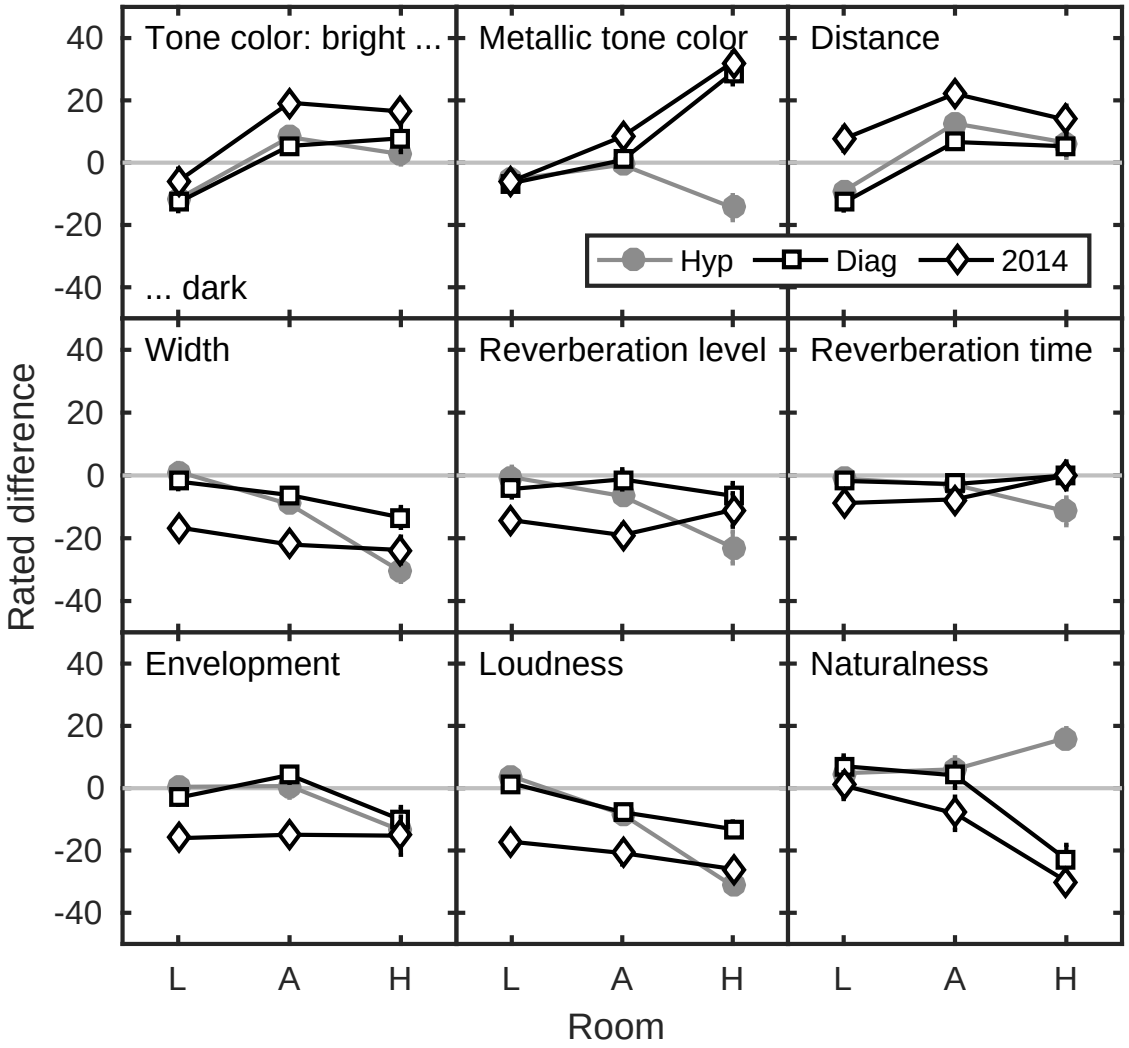
Measured vs. synthesized



Accuracy of T30



Perceptual ratings



Basic usage concepts

```
ir = razr(room, op);
```

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```
room.boxsize = [bx, by, bz];
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ir = razr(room, op);

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room.boxsize = [bx, by, bz];
room.materials = {’plaster’, ’brick’, ...
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room.boxsize = [bx, by, bz];
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room.srcpos  = [sx, sy, sz];
room.recpos  = [rx, ry, rz];
room.recdir  = [az, el];
```

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scene(room)
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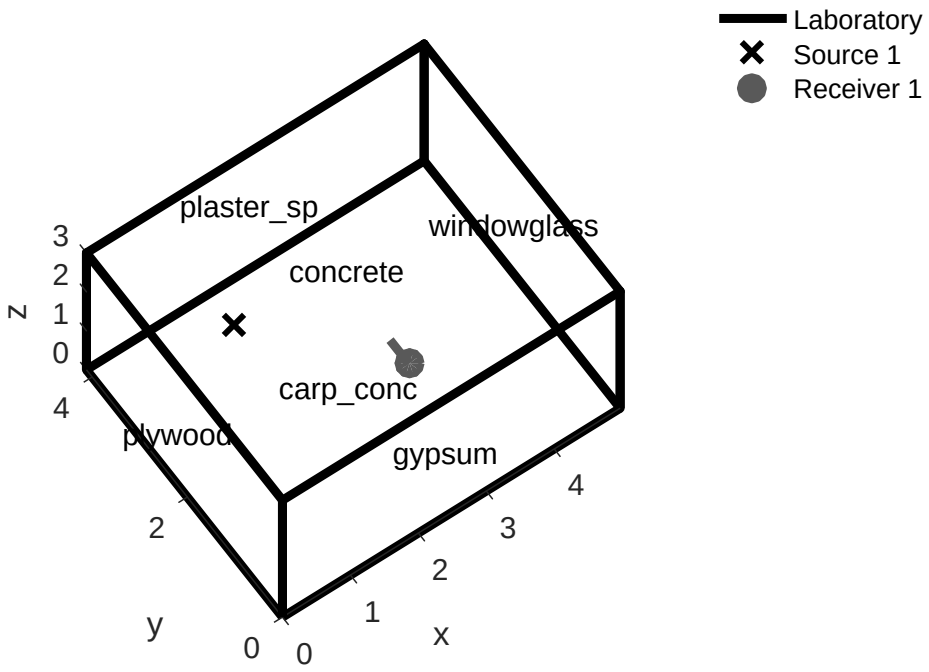

```
ir = razr(room, op);
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op.ism_order = 3;
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op.ism_order = 3;
op.spat_mode = 'hrtf';
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% See all options in:
get_default_options.m
```

```
ir = razr(room, op);
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```
ir.sig
ir.fs
...
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% If op.return_rir_parts == true:
ir.sig_direct
ir.sig_early
ir.sig_late
```

ir = razr(room, op);

```
ir.sig
ir.fs
...

% If op.return_rir_parts == true:
ir.sig_direct
ir.sig_early
ir.sig_late

% Analysis tools:
plot_ir(ir)
plot_irspec(ir)
out = apply_rir(ir);    % auralize
```

Syntax alternatives

```
ir = razr(room);
ir = razr(room, op);
ir = razr(room, Name, Value, ...);
ir = razr(room, op, Name, Value, ...);
```

Tutorials

1. Basic exercises (recommended for all)
2. Advanced exercises (choose the ones you like)

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   - Becoming familiar with RAZR
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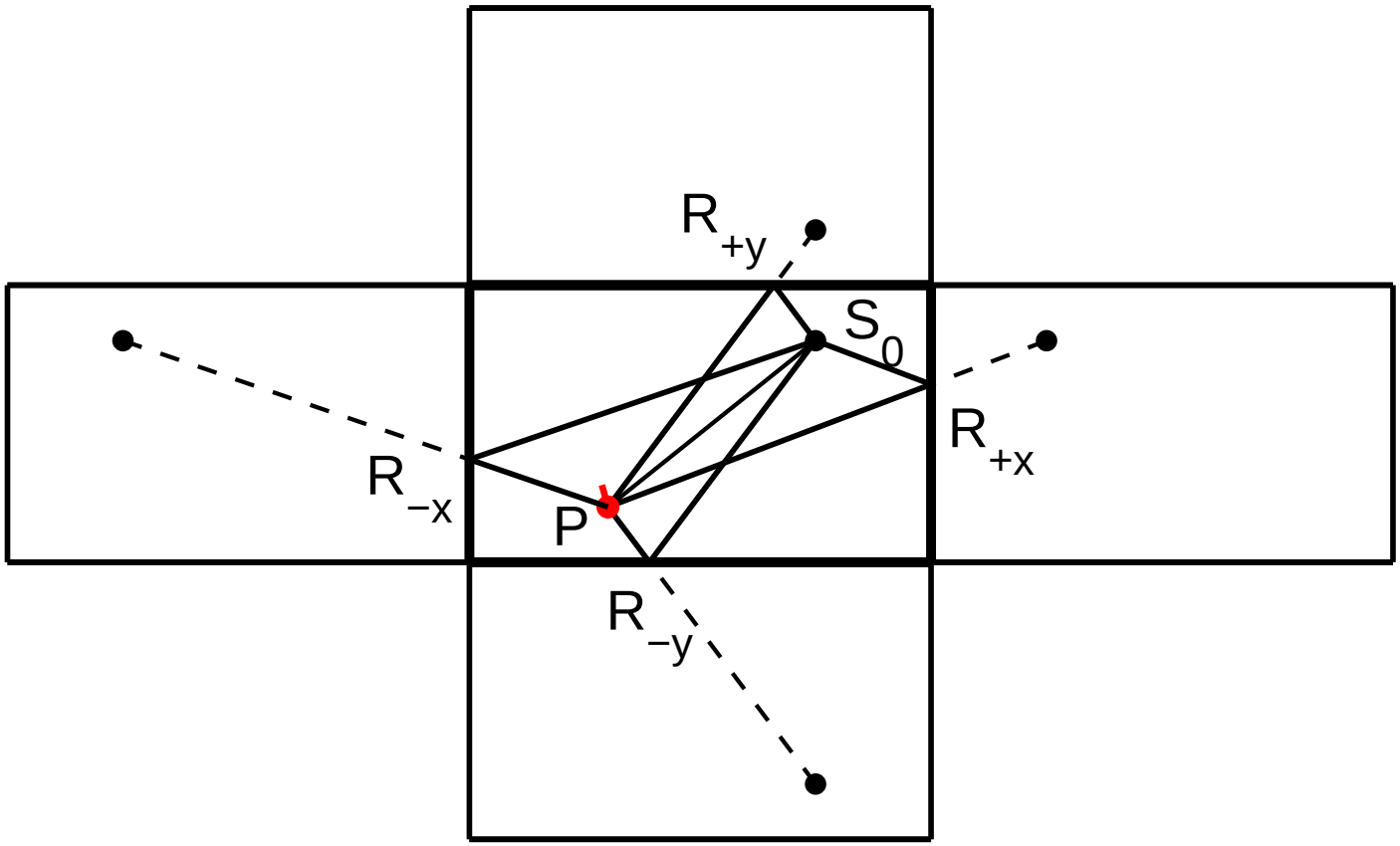
1. Basic exercises (recommended for all)
   - Becoming familiar with RAZR
2. Advanced exercises (choose the ones you like)
   - Recreate a measured BRIR
   - RAZR in AFC
   - VR-Lab
   - Synthesis options, ISM only
   - Coupled rooms
   - Scattering
   - Any wishes?

Appendix

Image source model (ISM)

(Allen & Berkley, 1979)



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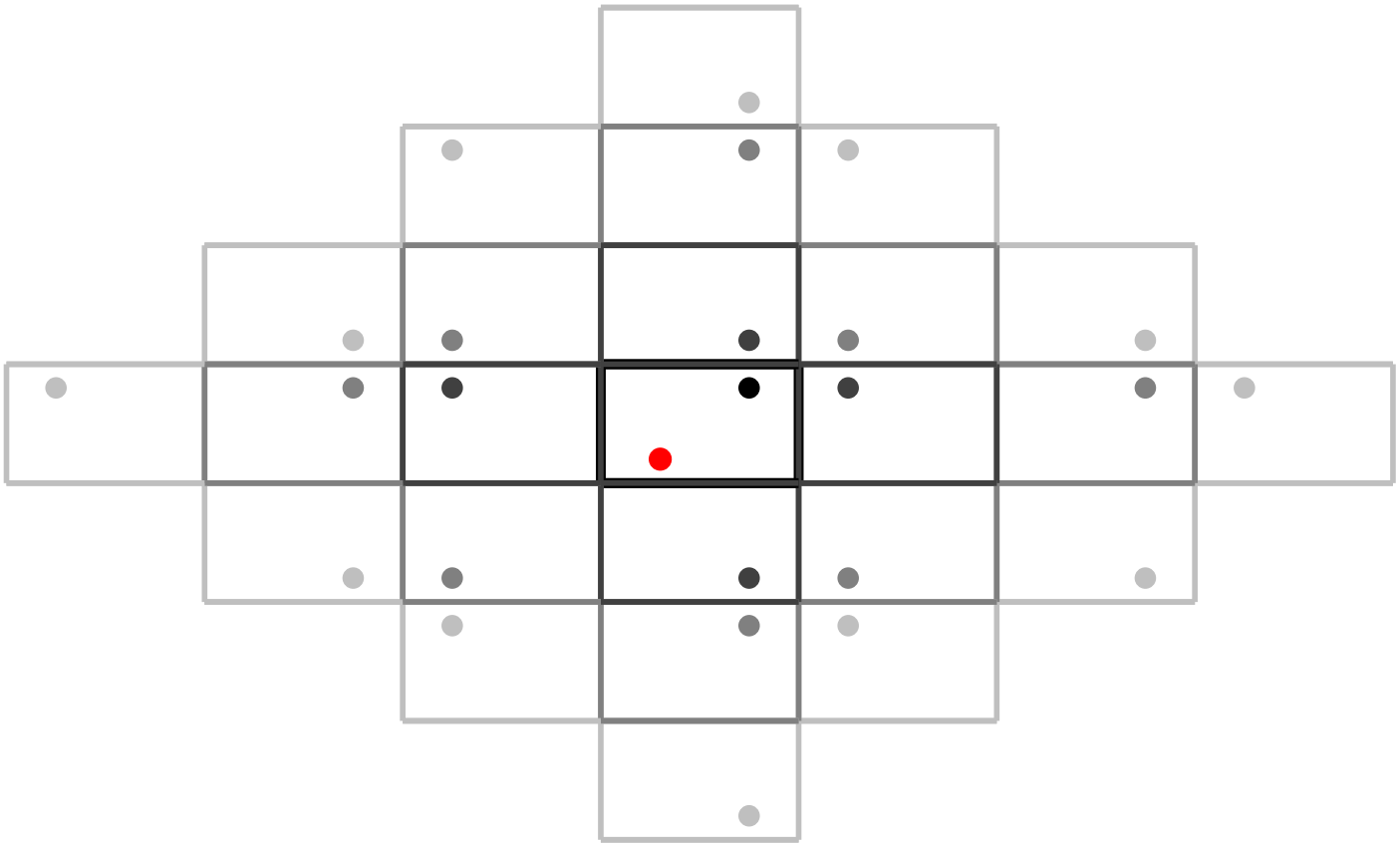
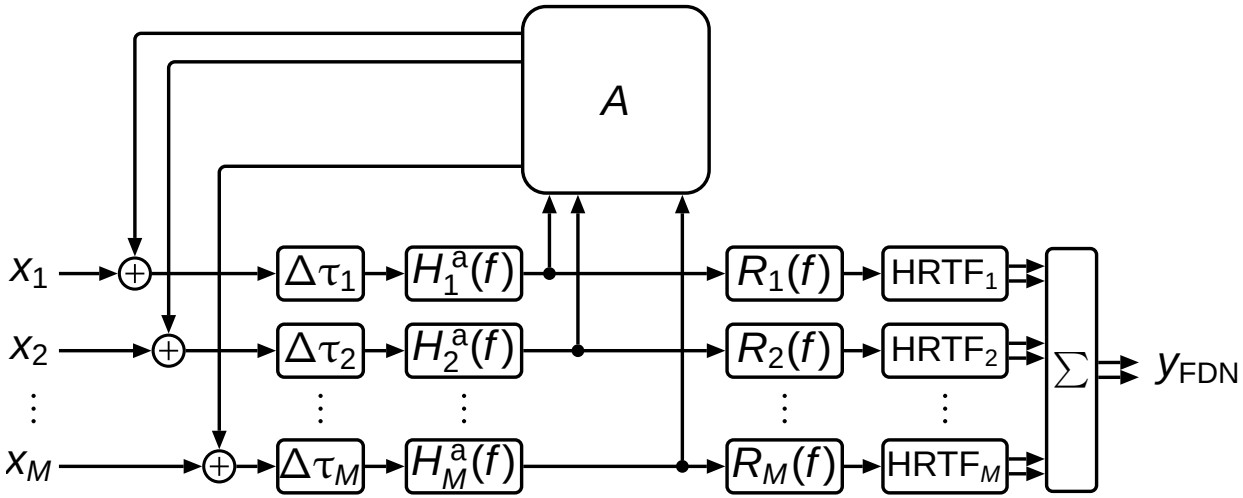


Feedback delay network (FDN) (Jot & Chaigne, 1991)



Reverb cube mapping: