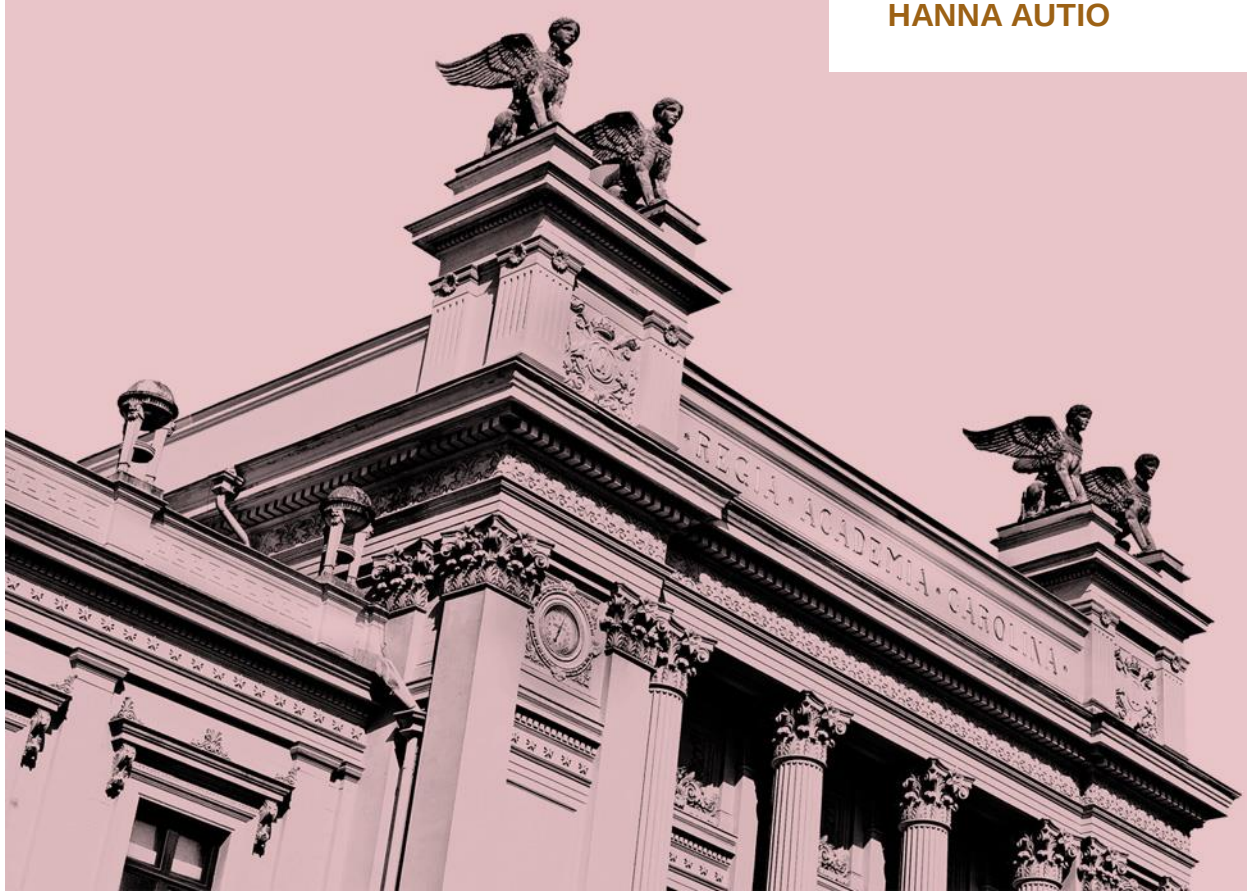
Auralization

HANNA AUTIO



What is auralization?

- Wikipedia: ”a procedure designed to model and simulate the experience of acoustic phenomena rendered as a soundfield in a virtualized space.”

- But why?

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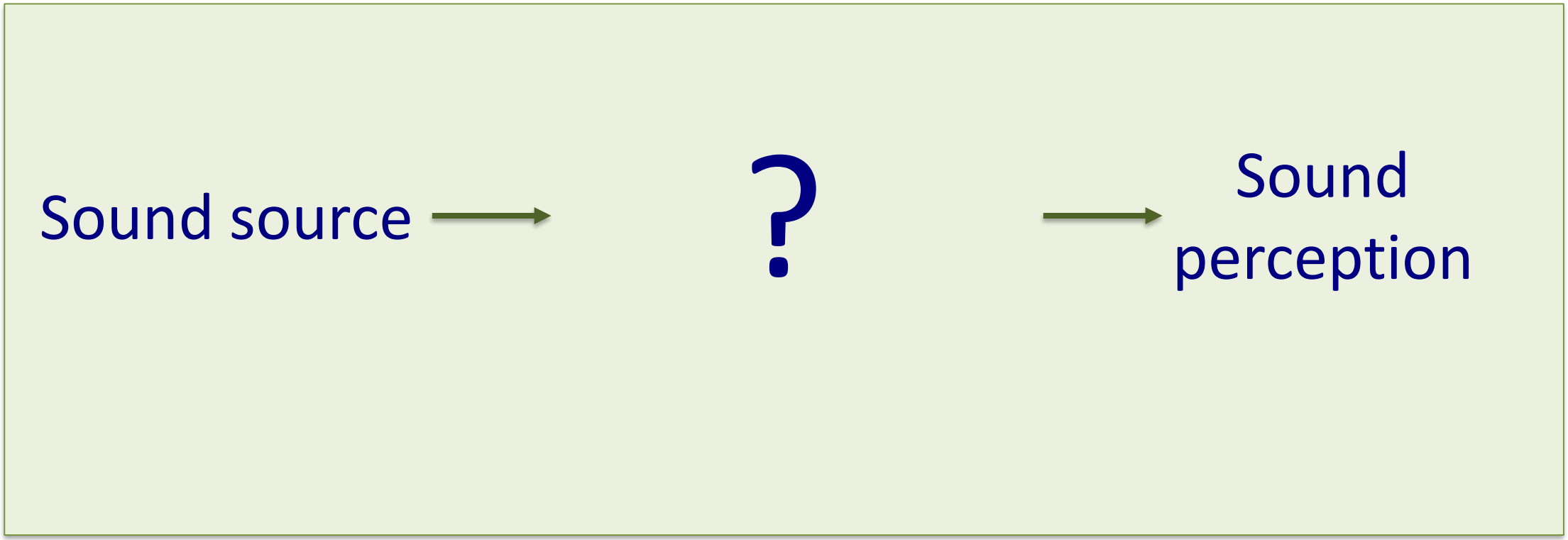
The principles of auralization



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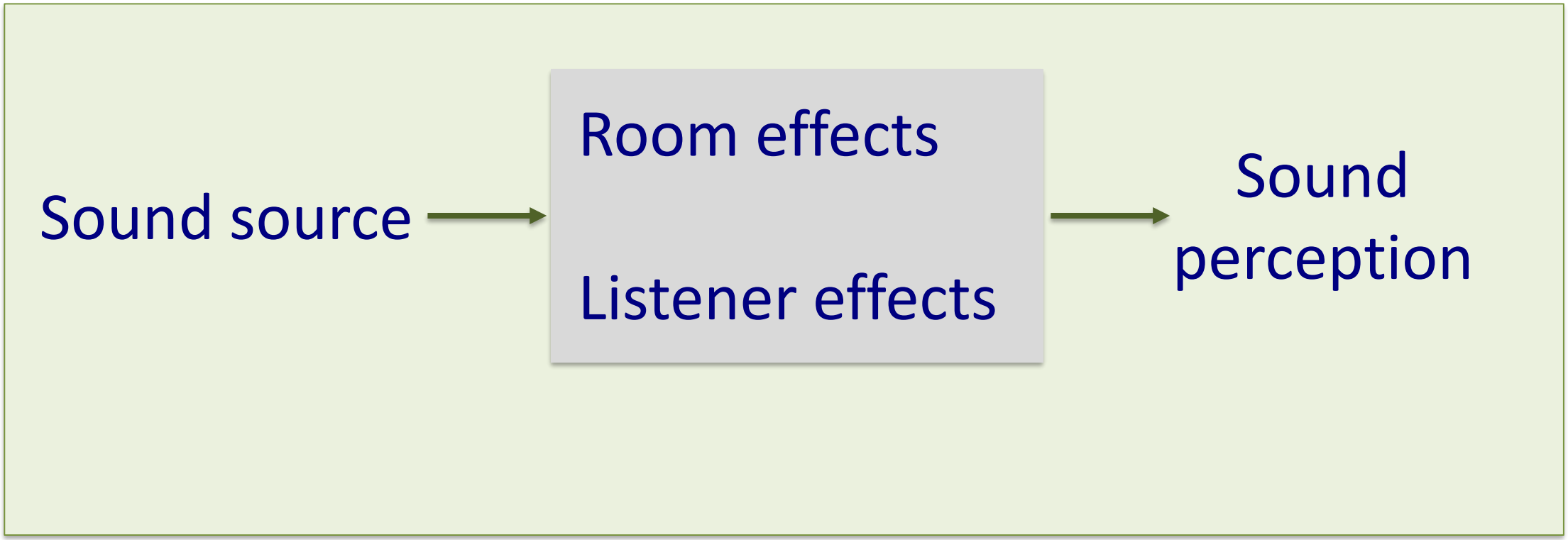
The principles of auralization



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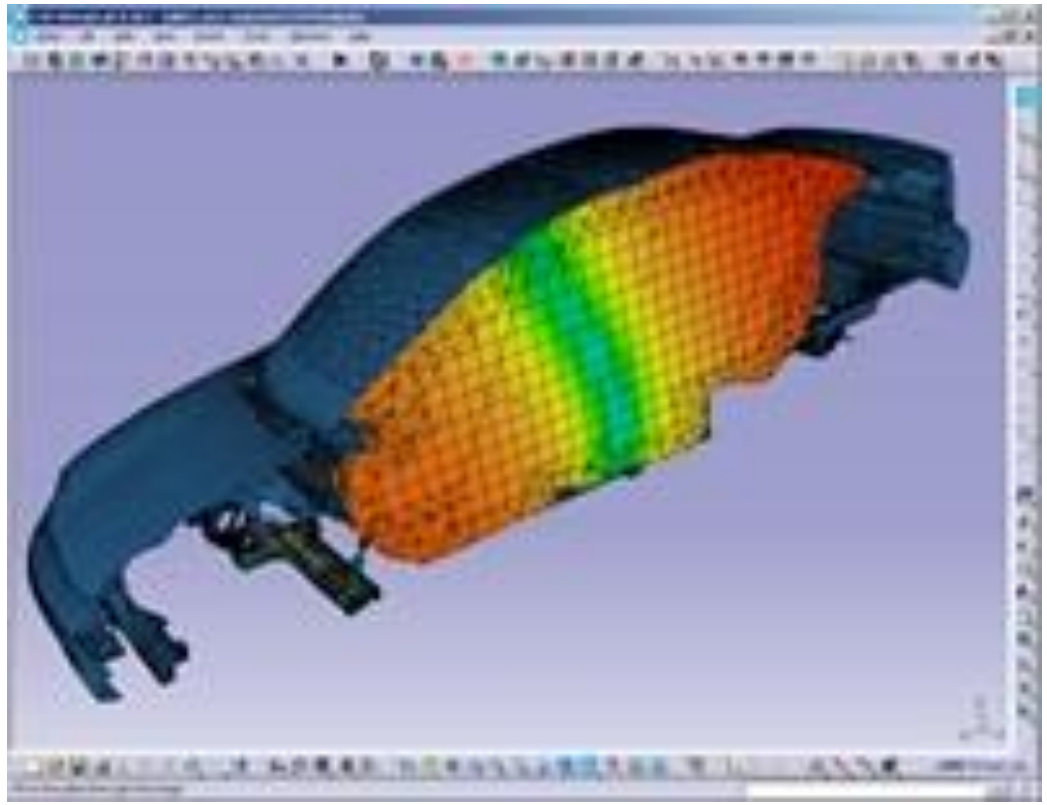
Something about LTI systems

- See separate files

Determining the impulse response

- In rooms
  - Measurements
  - Calulations/Simulations

Wave based simulations



- Numerical methods such as FEM, BEM, FDTD
- Dense meshes → Long calculation time
- High accuracy

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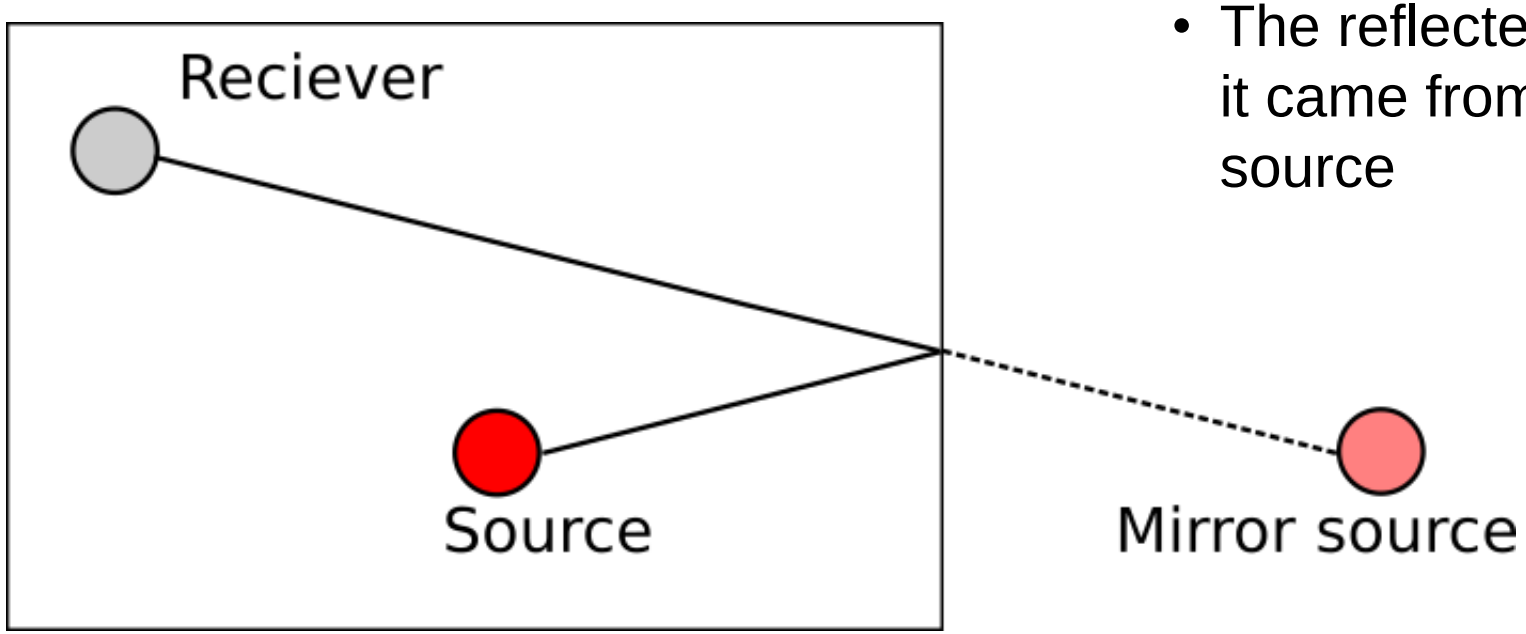
Geometrical acoustics

- Based on approximations
- No wave phenomena.
  - Interference and resonance
  - Diffraction
- Model sound energy propagation
  - Image source
  - Raytracing
  - Radiosity methods

Image source method



- The reflected sound is as if it came from an additional source

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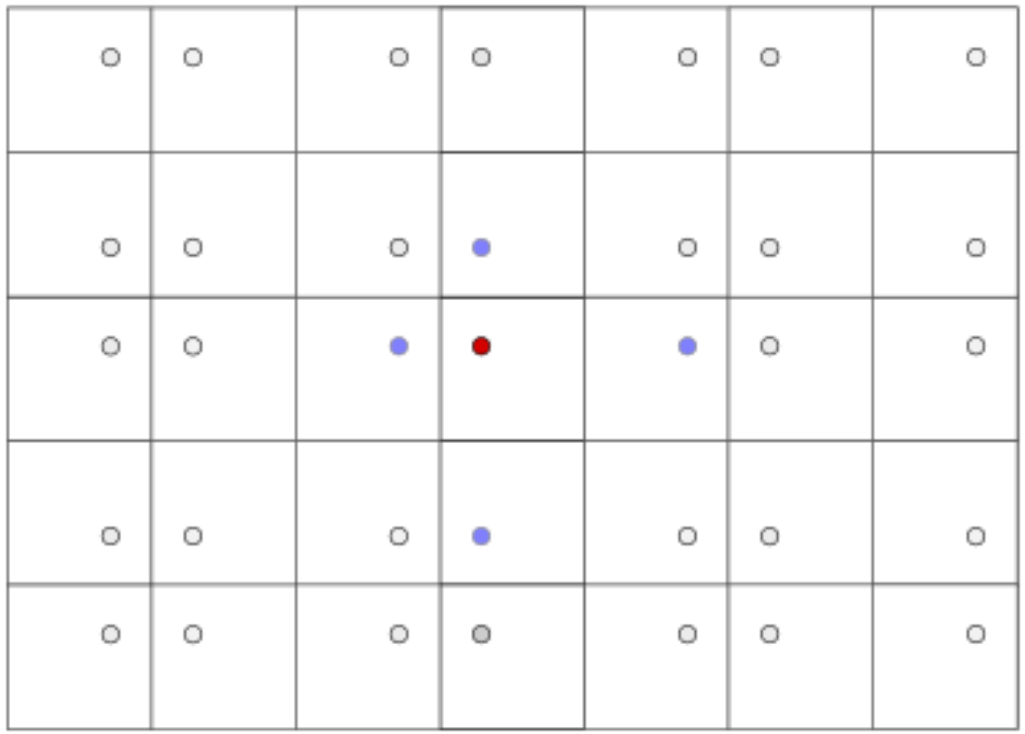
Image source method



- Time delay and attenuation
- Issues with room shape
- Variations on the image source method.

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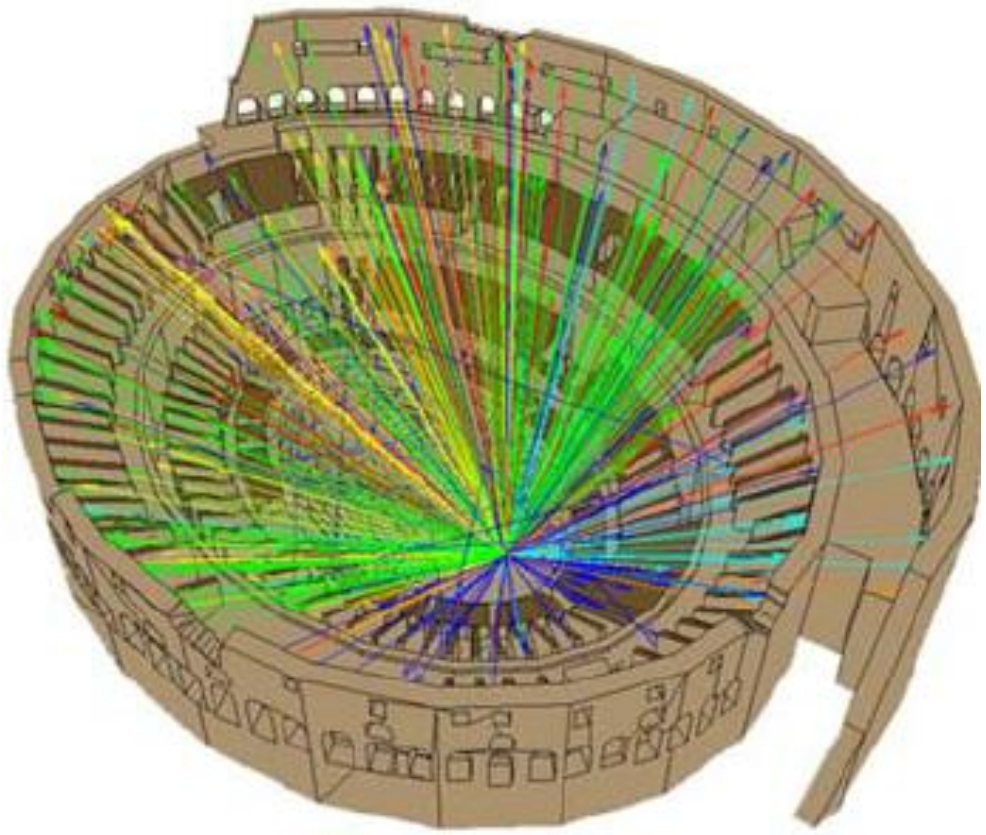
Raytracing



- Source-reflection-receiver
- Reflection
- Issues and limitations

Navvab, Mojtaba & Heilmann, Gunnar & Meyer, Andy. (2012). Dynamic Variation of the Direct and Reflected Sound Pressure Levels Using Beamforming.

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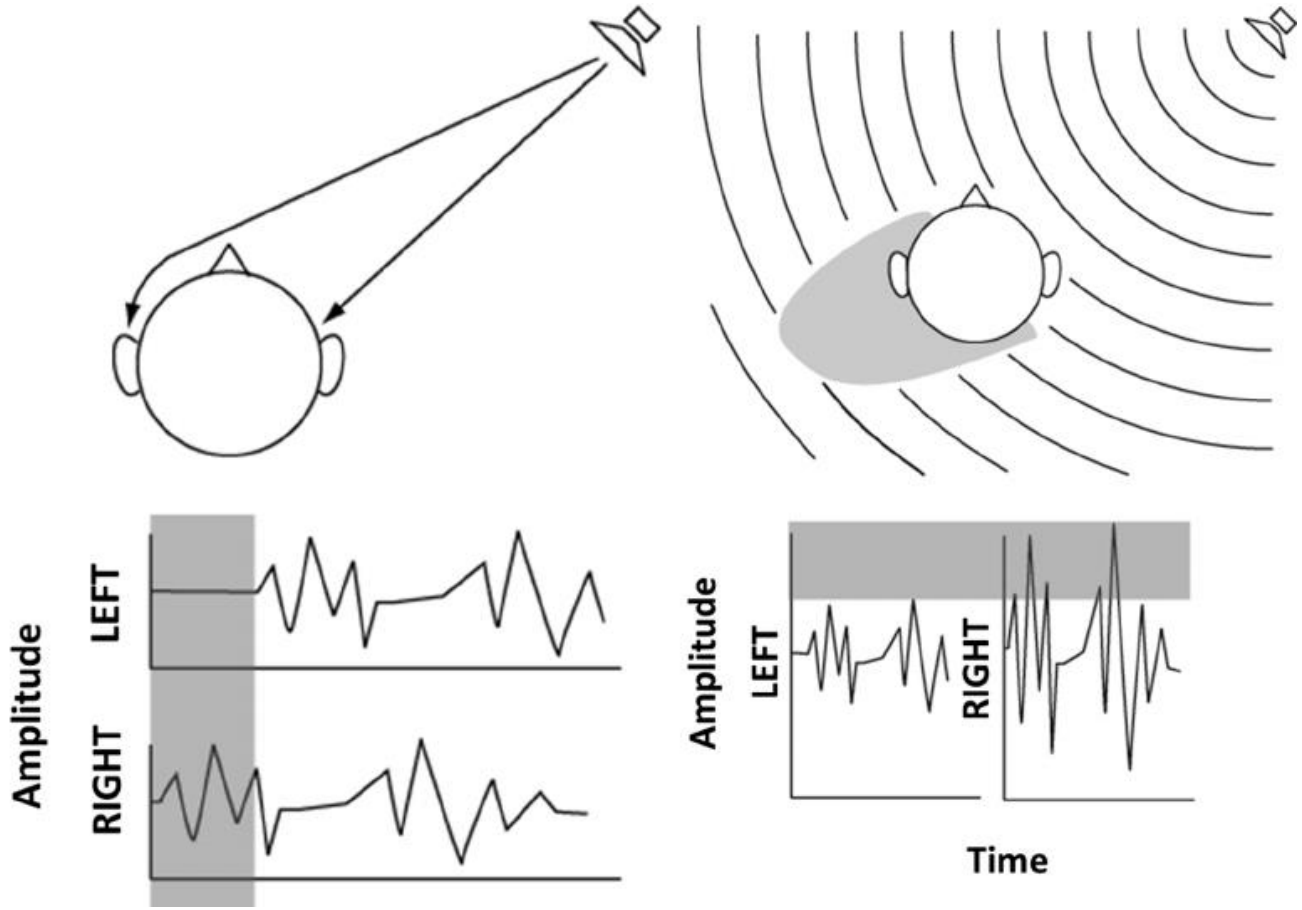
What about the listener related stuff?

- Another black box
- HRIR
- What effects are there?

Head effects



- Interaural Time Difference
- Interaural Level Difference

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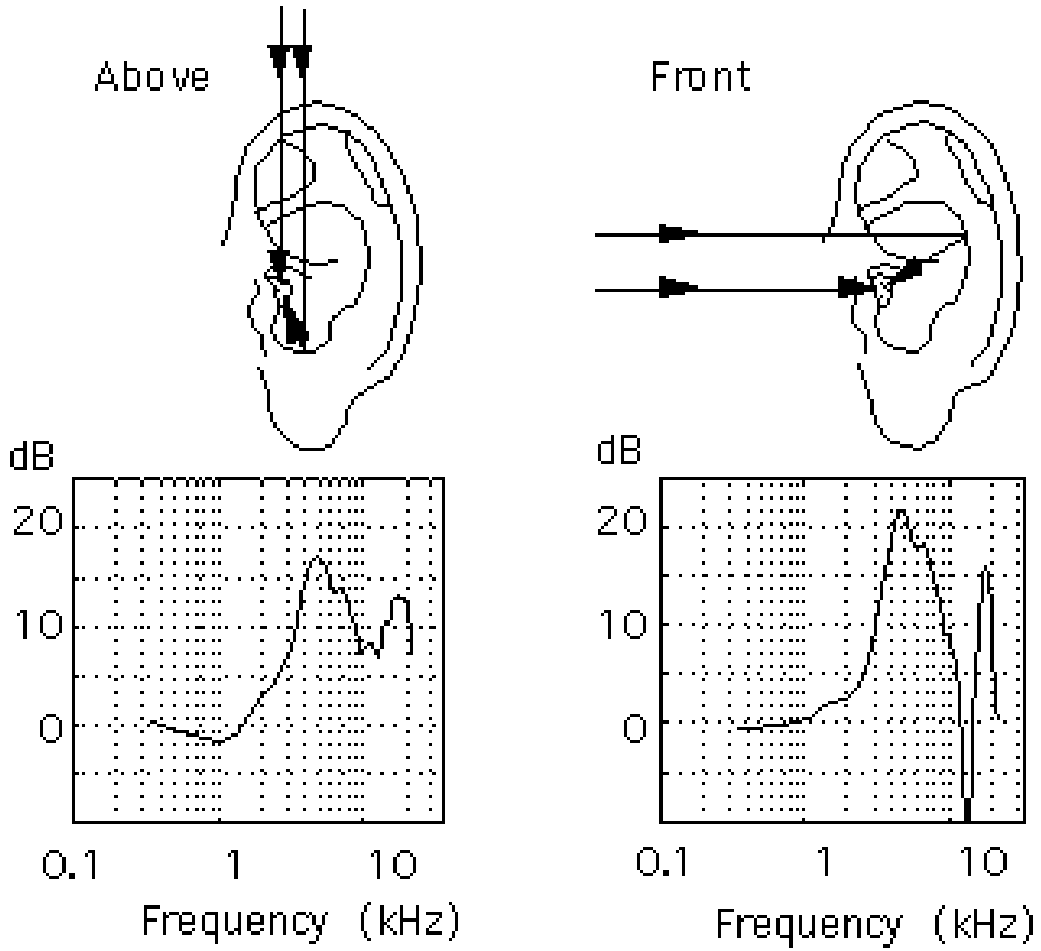
Ear effects



- Destructive and constructive interference

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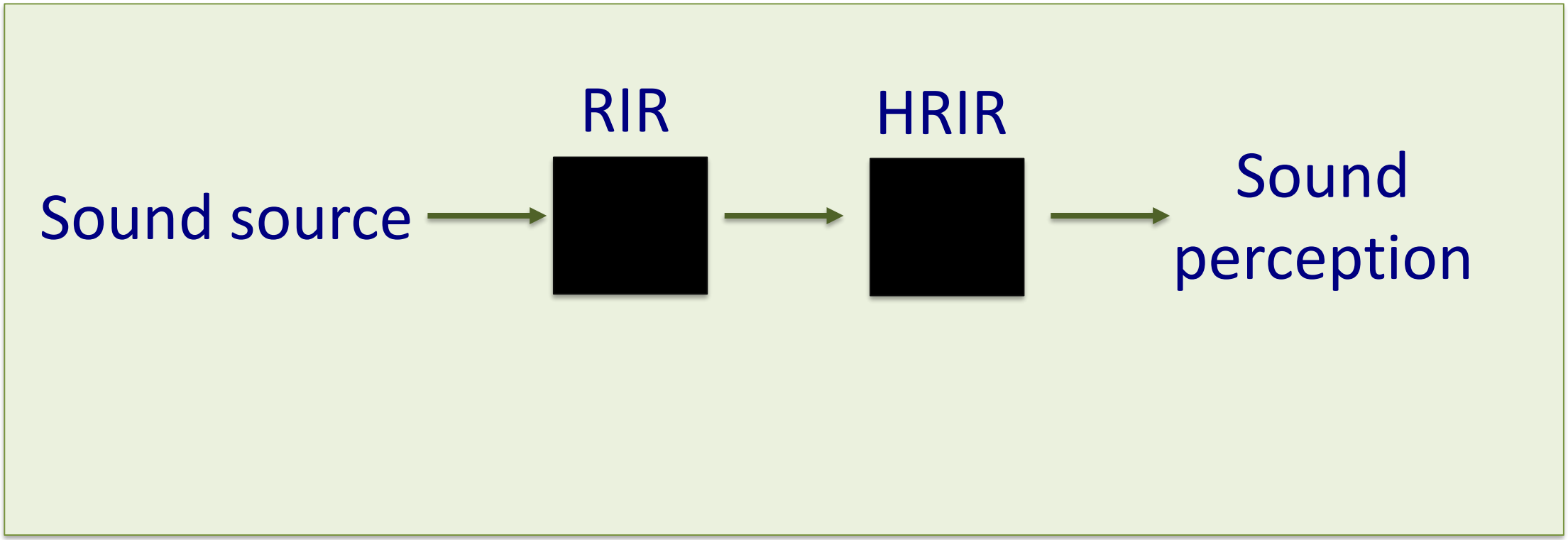
In conclusion



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