ETRI

Center Channel Separation
based on Spatial Analysis

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## Music 2.0 : Interactive Music Service

● **Multi-track interactive music service**

  ▪ Each separated instrument can be selected and controlled
  ▪ User mixing, Multiple mixing version, Vocal training
  ▪ Commercialized in Korea('07 1Q), as a digital music album

Producer Mix

User Mix

Karaoke
(Vocal Training)

● **Conventional stereo music contents can be break down?**

  ▪ If yes, you can play with any music contents interactively
  ▪ Sound source separation based on spatial analysis is helpful
    - Reversible change maybe possible

Original   Separated   Synthesized
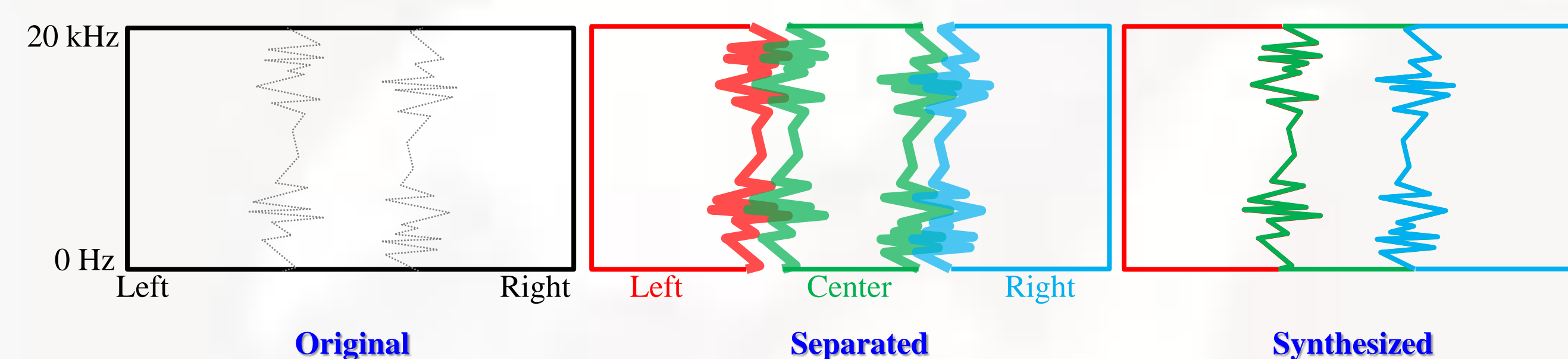
Spatial Audio Analysis

● **Multi-track music production using power panning**

  ▪ Each track sound is rendered
    by power panning
  ▪ Properly divided T/F slice can
    be a part of sound source
  ▪ If this slice is composed with
    parts of several sound sources
    : *correlation provides a cue*

Gain — Channel (L, C, R), Sound Image
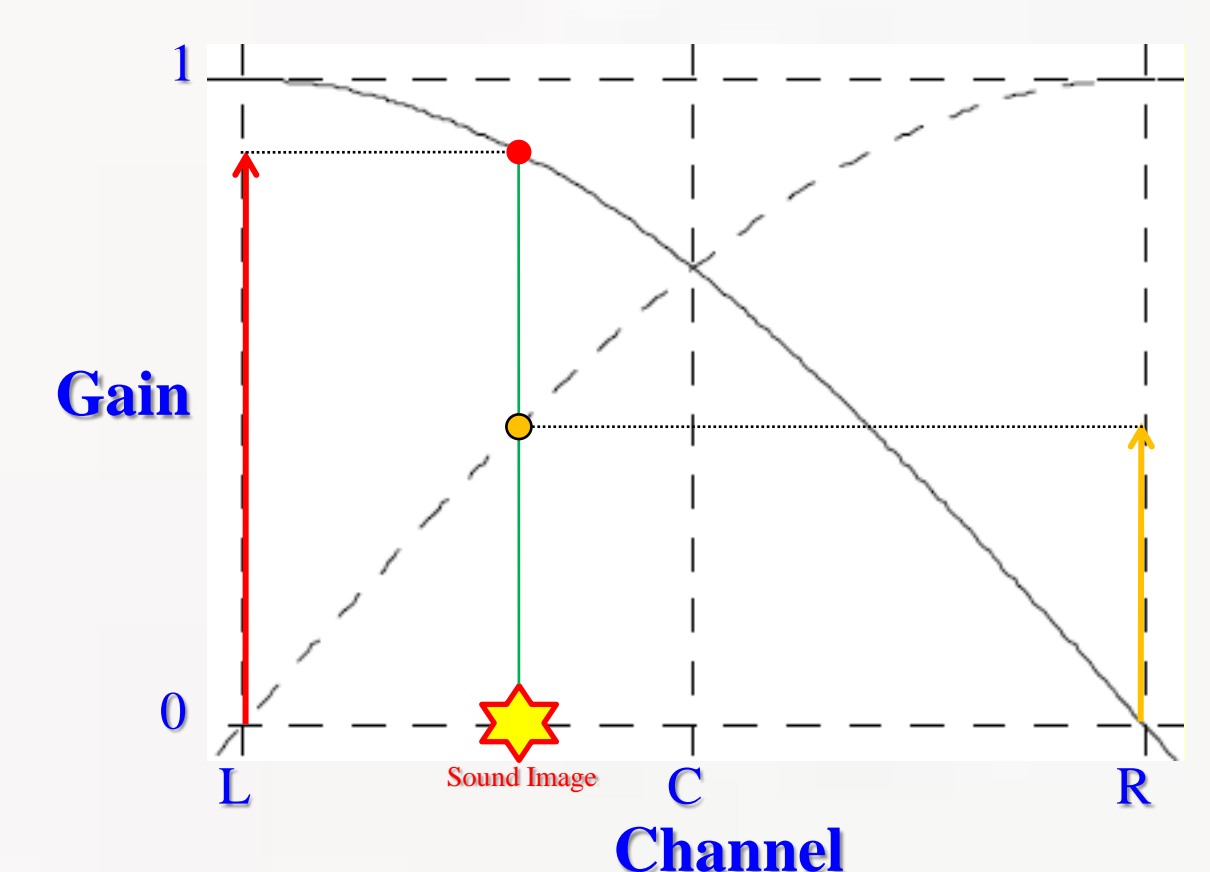
● **Spatial cues for spatial image for a sound source**

  ▪ ICLD: Sound source position cue
  ▪ ICC: Sound source wideness or portion cue

Sound source position estimation

Wideness and sound source distribution according to ICC value
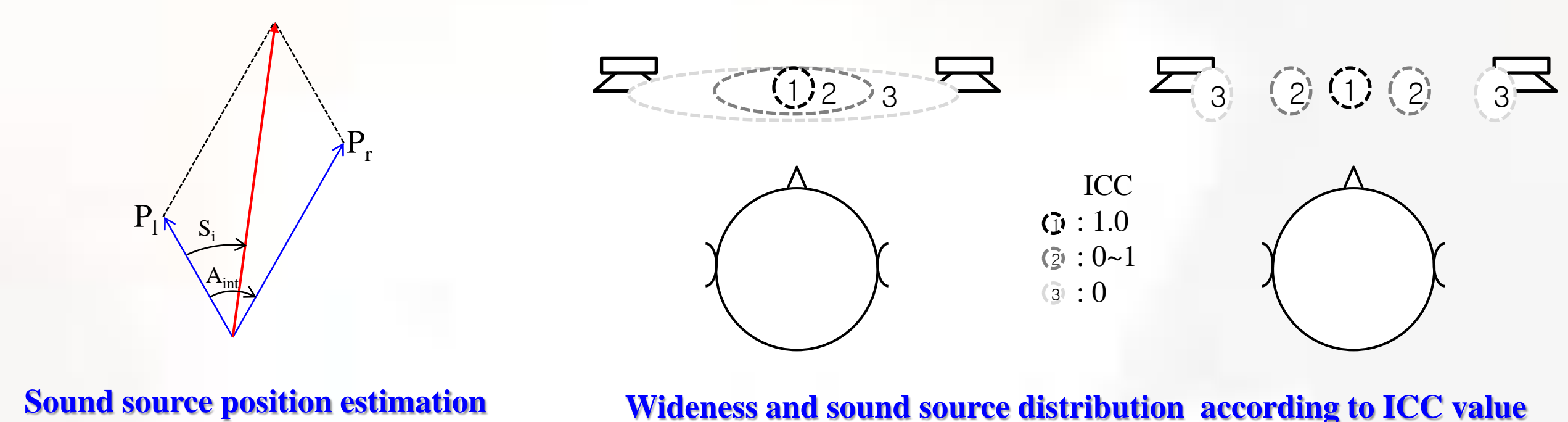
Spatial Filter for Studio Music Signal

● **Sound source position estimation**

  ▪ Single sound image can be exactly estimated
  ▪ Mixed sound image blurred according to ICC value

Single source position estimation results

Mixed source estimation and its ICC
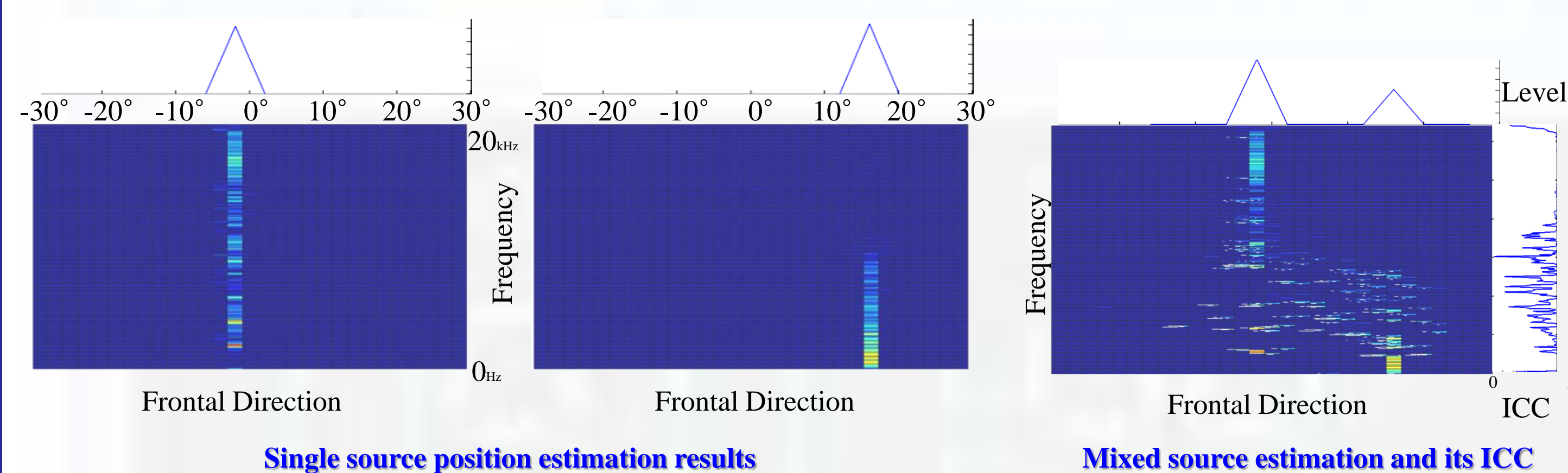
● **Spatial filter using ICLD and ICC parameter**

  ▪ Spatial filter can be devised using ICLD and ICC
  ▪ Spatial filter for center channel can be implemented by tuning

Spatial filter using only ICLD

Spatial filter using both ICLD and ICC

Spatial filter for center channel
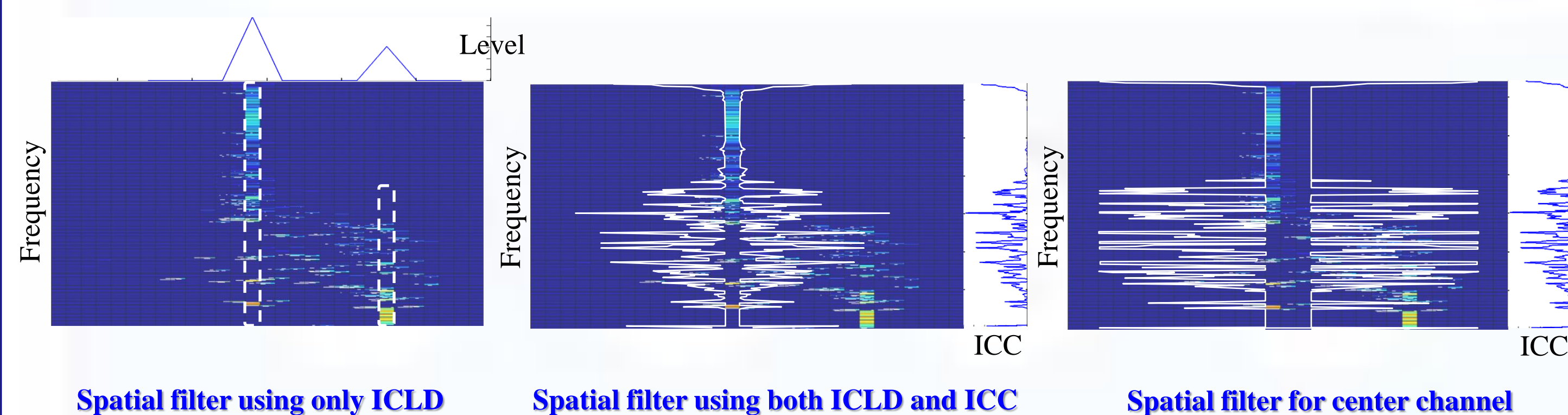
Results and Applications

● **Channel extension**

  ▪ Surround channel signal can be generated from separated
    front channel signal
    - Matrix, Reverberator

Channel Extension

Center Localization
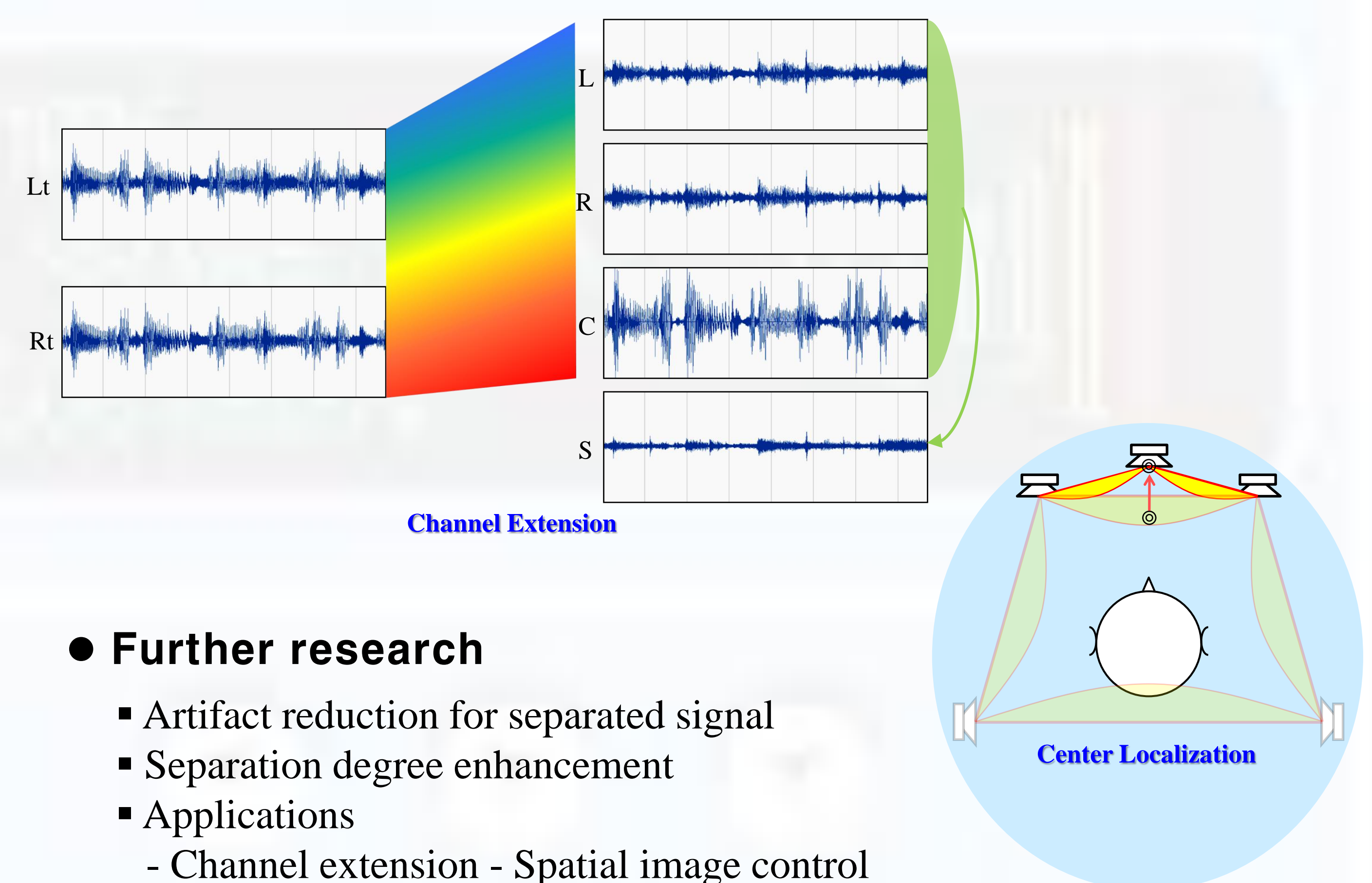
● **Further research**

  ▪ Artifact reduction for separated signal
  ▪ Separation degree enhancement
  ▪ Applications
    - Channel extension - Spatial image control
    - Source separation - Parametric Equalization

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