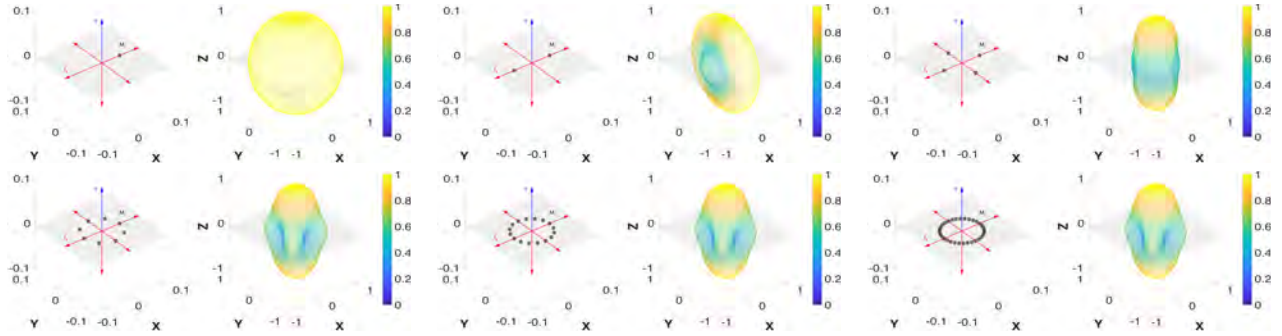

Figure 10: Here the microphone array geometry is a circle with a fixed 5cm radius in the X-Y plane. We examine how changing the number of microphones on this circule affects the average beam pattern of the beamformer. The definition of beam pattern is presented in Appendix C. [Top-Left] A single microphone yields an omnidirectional response. [Top-Middle] Two microphones improves directionality by suppressing two side interferers, but not the others. [Top-Right] Four microphones improves directionality further. [Bottom-Left] Eight microphones are better, and the performance plateaus as 16 [Bottom-Middle] or 32 [Bottom-Right] microphones yield no clear improvement.

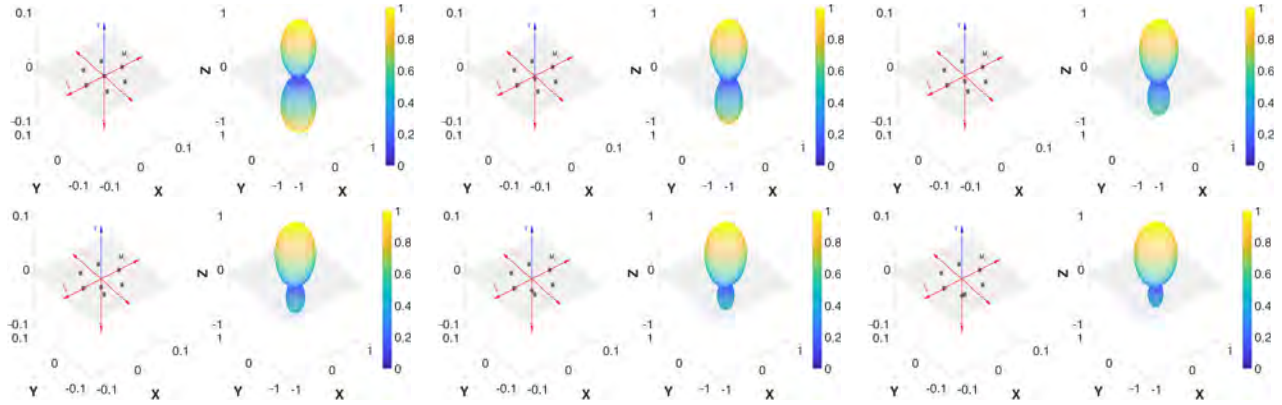

Figure 11: 3D asymmetries. Effect of MVDR beamforming as a microphone as added to the third dimension. We consider our baseline 6-microphone circular planar array and we add an extra microphone at the center. We then move the extra mic along the negative z-dimension to break the 2D symmetry and observe how this affects the gain for the previously-ambiguous interference behind the array. [Top-Left] The extra mic is at z=0, and so the symmetry remains. [Top-Middle] The extra mic moves down the negative z-axis by 5mm, and the gain in the direction of the interferer subsides. As the microphone moves further along the axis by 10mm [top-right], 15mm [Bottom-Left], 20mm [Bottom-Middle], and 30mm [Bottom-Right], the gain in the direction of the interferer attenuates more and more while the gain in the direction of the target remains maximal.