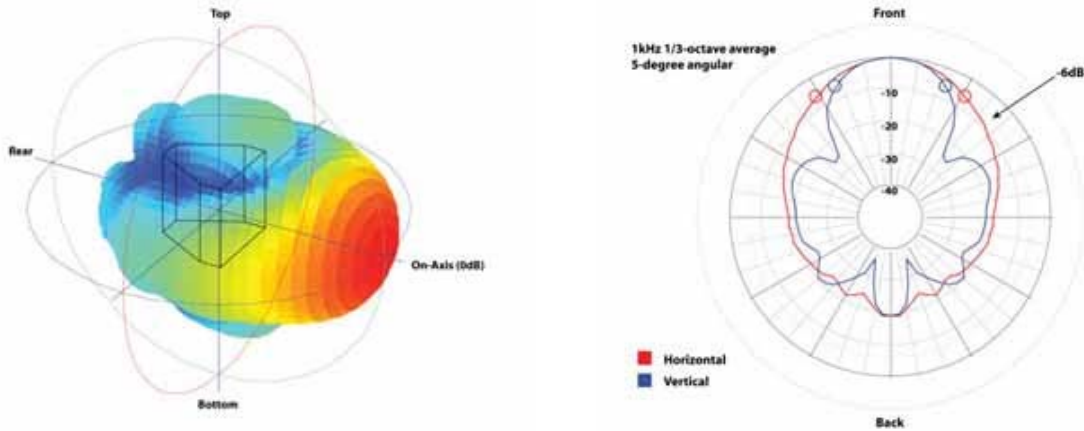


Nowadays, loudspeaker angular response data can be routinely obtained in 3-D using *e.g.* dedicated PC-based data acquisition (DAQ) systems. The measured 3-D response data is displayed in so-called loudspeaker 3-D radiation balloon plots, as shown in the figure below.



The 2-D polar response plots thus are simply *e.g.* horizontal or vertical slices through the 3-D radiation balloon plots.

(b) Combining two or more loudspeakers in an array changes the angular distribution of the sound radiation pattern (analogous to antenna arrays in *E&M* radiation), and hence the directivity factor, Q associated with the loudspeaker array. A vertical column of loudspeakers is equivalent to increasing the loudspeaker size in the vertical direction, but not in the horizontal direction. Line or column radiators are sometimes used in sound reinforcement systems because they increase the directivity factor Q in the vertical direction while maintaining the broad distribution of a single loudspeaker in the horizontal direction. An example of a 4-speaker column speaker is *e.g.* the Bosch LA1UW36X, shown in the figure below, with accompanying 3-D balloon plots:

