Appendix B: Scale for colormaps used in the power spectra (Figures 5, 6, SI Figure 2, and SI Figure 3)

Comparison of power spectra across scans, movement directions and treatments (filter and non-filter) is non trivial because a) the strength of head movement of each participant is different, and b) the power spectrum is a non-linear function. In order to have all the data on the same scale, we linearized the power spectrum of the data shown in Figures 5, 6, SI Figure 2, and SI Figure 3 using the following approach:

1. For each movement direction, the multitaper power spectral density (in dB) was calculated for each individual scan. Let's call this variable $P_{i,j}$, where i corresponds to the scan and j corresponds to the direction (x, y, z, θ_x…)
2. A log10 was applied to scale the data and the result was multiplied by 10: $P_{scaled} = 10\log_{10} P_{i,j}$
3. P_{scaled} was normalized using zscores: $P_{normal} = \text{zscore}(P_{scaled})$. Resulting values are linearized where extreme negative and positive values correspond to the relative low or high power along each line, respectively.
4. To keep a color map consistent for filtered and unfiltered data, we used as reference the linearized unfiltered data and the resulting linearization was applied to the filtered data. This step was implemented as follows:
   a. **Unfiltered data**: A linear model relating $P_{normal}$to P_{scaled} was fit for each scan and direction (i, j) to preserve the scale across scans and directions and the resulting coefficients were saved.
   b. **Filtered data**: P_{scaled} was calculated to each individual filtered scan and the linear model described in the previous step was applied to P_{scaled}. The resulting P_{normal} has the same limits used in the unfiltered data.
5. Scales are truncated to show relative power between 0.1 and 96%. Values less than 0.1 are colored as 0.1%. Values larger than 96% are colored as 96%