Description of the cross-correlaiton functions in Fig. 5C

The 3 cross-correlation functions in Fig. 5C in the main text are described below.

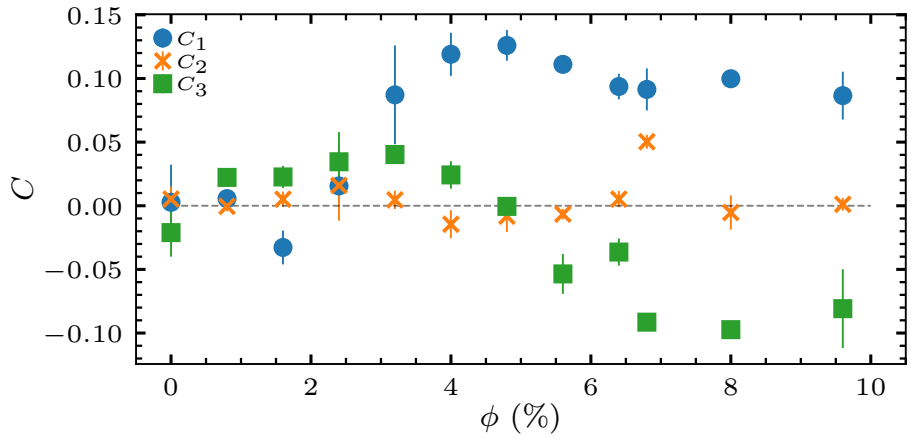

FIG. 1. Figure 5C in main text.

C_1 is the cross-correlation function between local density fluctuation δN and kinetic energy E. C_1 shown in Fig. 5C is an average over 1000 single frame correlation C_1', and C_1' is defined as

$$C_1' = \frac{\langle(\delta N - \overline{\delta N})(E - \overline{E})\rangle}{\sigma_{\delta N}\sigma_E} \tag{1}$$

C_2 is the cross-correlation function between local density N and divergence of bacterial flux $\nabla\cdot(N\boldsymbol{v})$. C_3 is the cross-correlation function between local density N and kinetic energy E. C_2' and C_3' are single frame correlations similar to C_1', and are defined as

$$C_2' = \frac{\langle(N - \overline{N})(\nabla\cdot(N\boldsymbol{v}) - \overline{\nabla\cdot(N\boldsymbol{v})})\rangle}{\sigma_N\sigma_{\nabla\cdot(N\boldsymbol{v})}} \tag{2}$$

$$C_3' = \frac{\langle(N - \overline{N})(E - \overline{E})\rangle}{\sigma_N\sigma_E} \tag{3}$$

$\overline{A}$ indicates the mean of variable A, σ_A indicates the standard deviation of A, and $\langle A\rangle$ denotes the average of A over all the positions.