



Figure S4 A through O: Fifteen consecutive tracks –omitting none– from the 100 stochastically independent tracks simulated for DS6 to compute the stochastic potential, its gradient and to perform the curl calculations. The color indicates the 1-2-3 curl modulus along the tracks. Only the segment constituting the closest approach to attractive fixed point #9 of each track is shown. All segments have equal time span. At the bottom of the stochastic potential well, the gradient is null, but the curl remains high. Hence, the immediate vicinity of the fixed point is dominated by curl forces. Grad forces are locally negligible. Every track segment points in a different random direction but the viewing angle is adjusted to reveal the characteristic helix discussed in the text. The X_1, X_2, X_3 axes are omitted for clarity. The magnification varies slightly between panels. **P** One track started far at $[X_1, X_2, X_3, X_4] / \Omega = [30, 30, 30, 30]$ in a region of very low curl. This track is heading to the fixed points. The elapsed time is the same as on all the other panels. Because the curl is low in this far region of phase space, local grad forces dominate and the track is linear: it lacks the helix characteristic seen on the other panels.