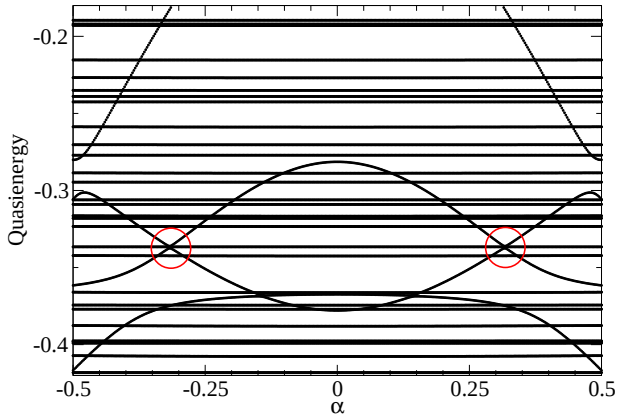

FIG. 1: Quasienergy spectrum of the ratchet system for time-symmetric driving ($K = 2.4$, $\omega = 1$, $\beta = 0$). The majority of the quasienergies show little dependence on the spatial asymmetry α, but the narrow avoided crossings (with a gap of $\Delta\epsilon \simeq 0.0014$) at $\alpha = \pm 0.32$ (highlighted by red circles) give rise to long-lived transient currents, with a duration much longer than typical experimental observation times, even though the temporal symmetry of the driving is not broken.

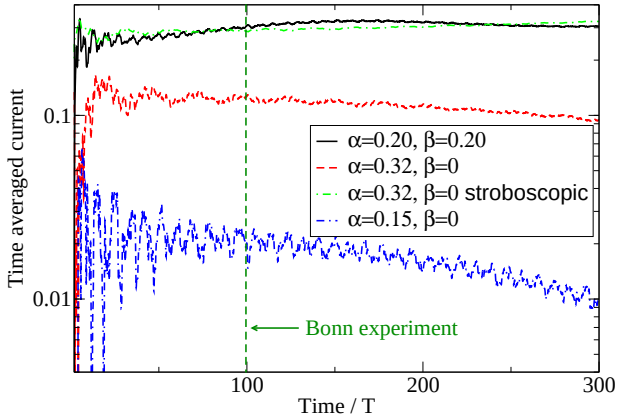

FIG. 2: Decay of the continuously averaged current $\langle I(t)\rangle$ for the strongly driven ratchet system, $K = 2.4$, $\omega = 1$, for different asymmetry parameters α and β. A typical experimental observation time, indicated by the vertical green line, is taken from the recent work of the Bonn group [4]. For $\beta = 0.2$ (black solid line) time-symmetry of the driving is explicitly broken and $\langle I(t)\rangle$ approaches a non-zero asymptotic value. When $\beta = 0$, however, the time-symmetry of the driving is not broken and asymptotically the ratchet current must decay to zero. For $\alpha = 0.32$ (red dashed line) the average current decays extremely slowly, due to a narrow avoided crossing in the quasienergy spectrum (see Fig. 1). We also plot the stroboscopically averaged value of the current (green dot-dashed line) for these driving parameters, which asymptotically approaches a constant value. For other values of α (blue dash-dot-dot line) the current decays more rapidly, but nonetheless remains significant over timescales much longer than those used in experiment.

[4] T. Salger, *et al.*, Science **326**, 1241 (2009).
[5] D H. Dunlap and V.M. Kenkre, Phys. Rev. B **34**, 3625 (1986).