## Direct compartmental simulations support the weak coupling assumption

We simulated a cable in which we inserted the voltage-dependent conductances that underlie the Morris-Lecar type II oscillator in the end segments. This continuous cable model does not use the explicit assumption of weak coupling. The cable has diameter 1 $\mu$m, membrane capacitance $C_{\mathrm{m}} = 1\,\mu\mathrm{F/cm}^2$, intracellular resistivity $R_{\mathrm{i}} = 0.2$ k$\Omega$ cm, and membrane resistance $R_{\mathrm{m}} = 20$ k$\Omega$ cm$^2$ with reversal potential $E_{\mathrm{L}} = -50$. In order for the active segments to generate oscillations while using the same conductance densities as in the Morris-Lecar model (see Methods), the active segments needed to be at least 150 $\mu$m in length. Current $I$ was injected into the active segments with the same current densities as in the Morris-Lecar model to produce oscillations. The leak conductance $g_{\mathrm{L}}$ in the active segments was decreased slightly to $g_{\mathrm{L}} = 0.3$ mS/cm$^2$. The cable was discretized into isopotential compartments with electrotonic length $\Delta x = 0.04\,\lambda = 20$ $\mu$m. The length of the passive stretch of cable in between the active segments was varied and the phase-locked solution was determined numerically. Stability of a phase-locked solution was tested by adding $0.1 - 0.6\,\mu\mathrm{A/cm}^2$ to one of the active segments for a duration of 100 ms (black bars above voltage traces in figure S1). Results from these simulations agree with our analytical predictions, showing synchronized phase-locking for small $L$, a bistable regime around $L \sim 1.5$ and anti-phase locking for larger $L$ (figure S1).