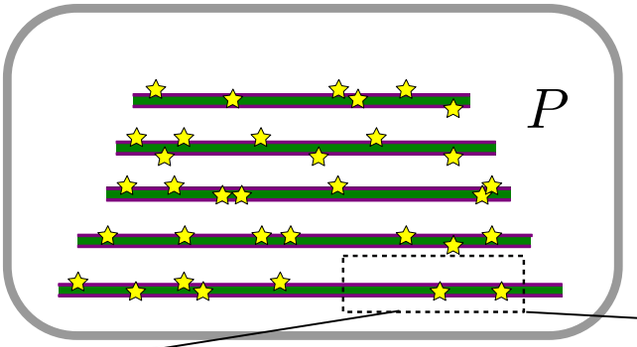
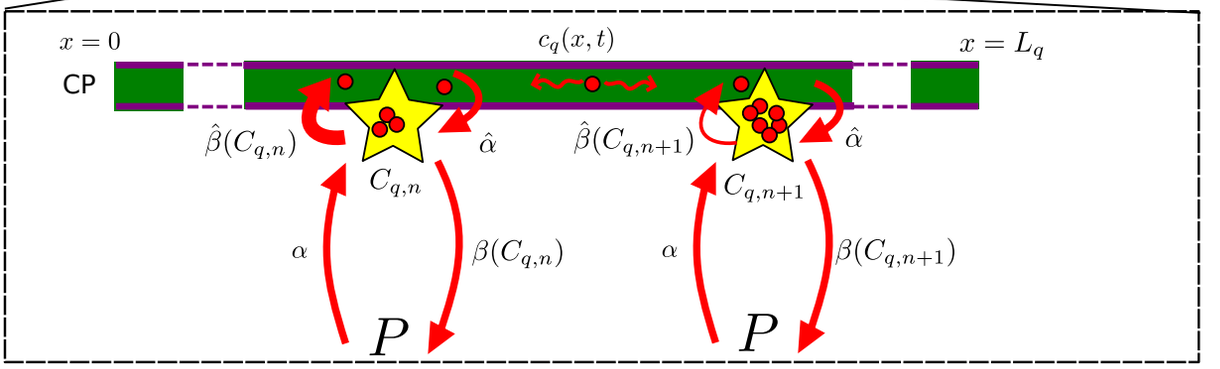
A



B



C

Equation System

SCs
$$\frac{\partial c_q}{\partial t} = D\frac{\partial^2 c_q}{\partial x^2} + \sum_{n=1}^{N_q} H_s(C_{q,n} - K_H)\left(\hat{\beta}(C_{q,n})C_{q,n} - \hat{\alpha}c_q(x_{q,n})\right)\delta(x - x_{q,n}), \quad 1 \le q \le Q,\ 0 \le x \le L_q,$$

RIs
$$\frac{\mathrm{d}C_{q,n}}{\mathrm{d}t} = H_s(C_{q,n} - K_H)\left\{\alpha P - \beta(C_{q,n})C_{q,n} + \hat{\alpha}c_q(x_{q,n}) - \hat{\beta}(C_{q,n})C_{q,n}\right\}, \qquad 1 \le q \le Q,\ 1 \le n \le N_q,$$

Nucleoplasm
$$\frac{\mathrm{d}P}{\mathrm{d}t} = \sum_{q=1}^{Q}\sum_{n=1}^{N_q} H_s(C_{q,n} - K_H)\left\{\beta(C_{q,n})C_{q,n} - \alpha P\right\},$$

Boundary conditions at SC ends
$$\frac{\partial c_q}{\partial x} = 0 \quad \text{at } x = 0 \text{ and } x = L_q, \quad 1 \le q \le Q.$$

Function definitions
$$\beta(C_{q,n}) = \frac{\beta_C}{1 + (C_{q,n}/K_C)^\gamma},\ \hat{\beta}(C_{q,n}) = \frac{\hat{\beta}_C}{1 + (C_{q,n}/K_C)^\gamma},\ H_s(s) = \frac{1}{2}\left(\tanh(sK_s) + 1\right),$$

Initial conditions
$$F = \mathcal{N}_T(\mu_F, \sigma_F^2, -3, 3), \quad \hat{C}_{q,n} = f(x_{q,n}/L_q)\mathcal{N}_T(1, \sigma_C^2, -3, 3),$$
$$C_{q,n}(t=0) = R_{RI}F\frac{\hat{C}_{q,n}}{\sum_{q'=1}^{Q}\sum_{n'=1}^{N_q}\hat{C}_{q',n'}}, \qquad c_q(t=0) = \frac{R_{SC}F}{\sum_{q'=1}^{Q}L_{q'}}, \quad P(t=0) = 0$$

D

	WT	WT+nuc	Unit	Description
D	1.1	1.1	$\mu\mathrm{m}^2\mathrm{s}^{-1}$	HEI10 diffusion coefficent on SC
α	0	0.014	s^{-1}	RI HEI10 absorption rate from nucleoplasm
β_C	0	0.003	s^{-1}	RI HEI10 escape rate into nucleoplasm
$\hat{\alpha}$	2.1	1.89	$\mu\mathrm{m}\,\mathrm{s}^{-1}$	RI HEI10 absorption rate from SC
$\hat{\beta}_C$	0.5	0.45	s^{-1}	RI HEI10 escape rate onto SC
γ	1.25	1.25		Escape rate Hill coefficient
K_C	1	1	au	Hill function threshold
K_H	0.5	0.5	au	Smooth switchoff threshold
K_s	10	10	au^{-1}	Smooth switchoff sharpness
x_e	0.1	0.1		Telomere length (fraction of chromosome pair)
f_e	2.0	2.0		Telomere weighting for RI loading
ρ	0.5	0.5	$\mu\mathrm{m}^{-1}$	Average RI density along chromosome pairs
R_{RI}	0.76	0.76		Proportion of initial HEI10 loaded at RIs
R_{SC}	0.24	0.24		Proportion of initial HEI10 on SCs
μ_F	1170	1170	au	Mean initial total cellular HEI10 amount
σ_F	75	75	au	Standard deviation of total initial HEI10 amount
σ_C	0.33	0.33	au	Relative noise in HEI10 RI loading
T	36000	36000	s	Simulation duration
Q	5	5		Number of chromosome pairs

E

L_q	Length of the q-th chromosome pair
P	Amount of HEI10 in nucleoplasmic pool
$C_{q,n}$	Amount of HEI10 in the n-th RI on the q-th chromosome pair
$c_q(x)$	Amount of HEI10 per unit length on the q-th chromosome pair
x	Distance along the chromosome pair
$x_{q,n}$	Distance of n-th RI along the q-th chromosome pair
q	Chromosome pair index $1 \le q \le Q$
n	RI index along chromosome pair
N_q	Number of RIs on q-th chromosome pair