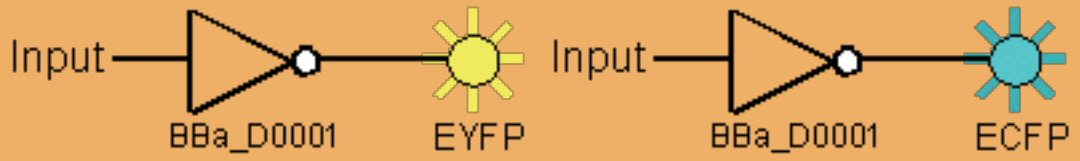

MIT
Bio Bricks
Data Book

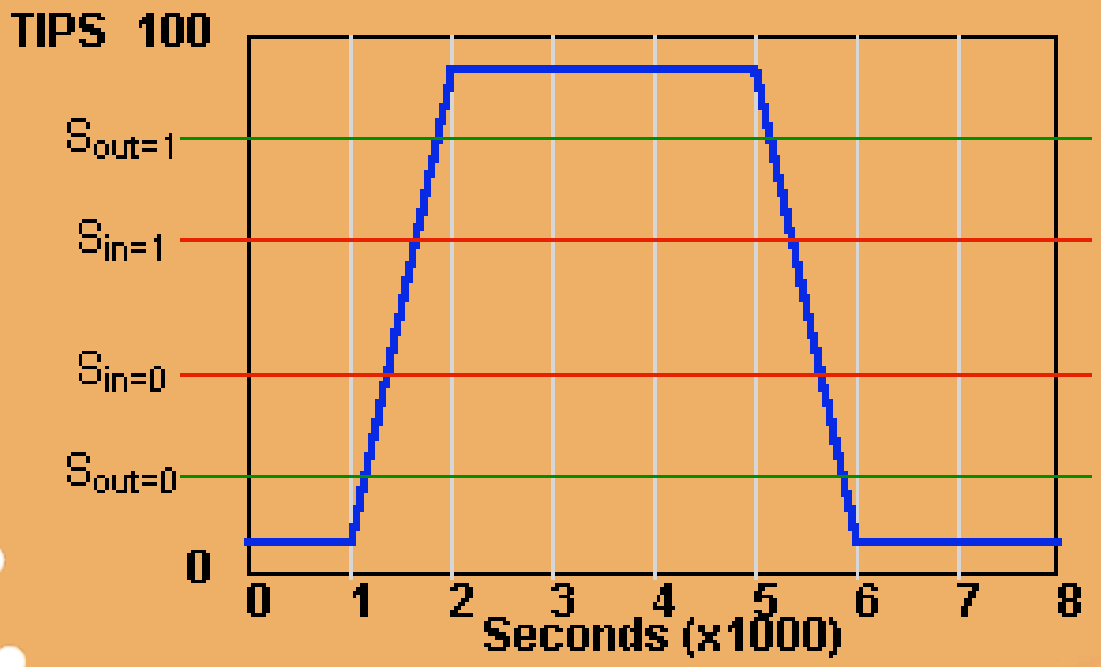
TIPS - Transcription Initiations Per Second

Implied TIPS (ITIPS)

the number of times the RNA Polymerase binds to the regulatory region and begins transcription of the protein



Standard Waveform



Definition
Value (TIPS)

$S_{out=0}$
Output Maximum Zero
20

$S_{out=1}$
Output Minimum One
80

$S_{in=0}$
Input Min Zero Threshold
40

$S_{in=1}$
Input Max One Threshold
60

BioBricks Design Elements

Ribosome Binding Site

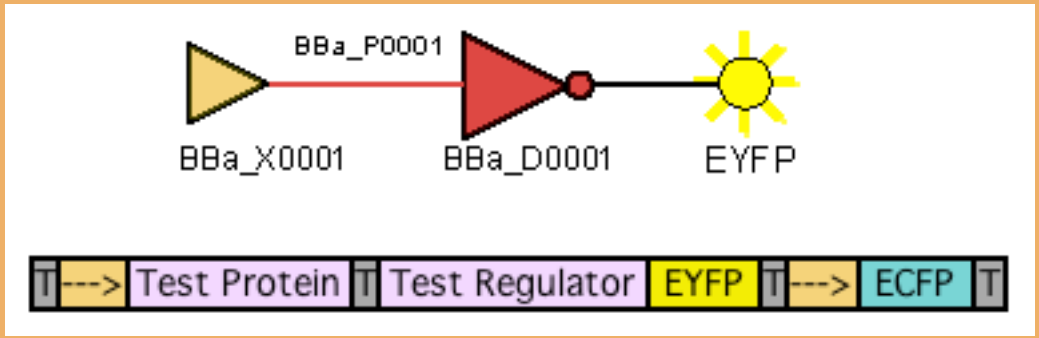
BBa RBS-1

attaaagaggagaaaggtacc

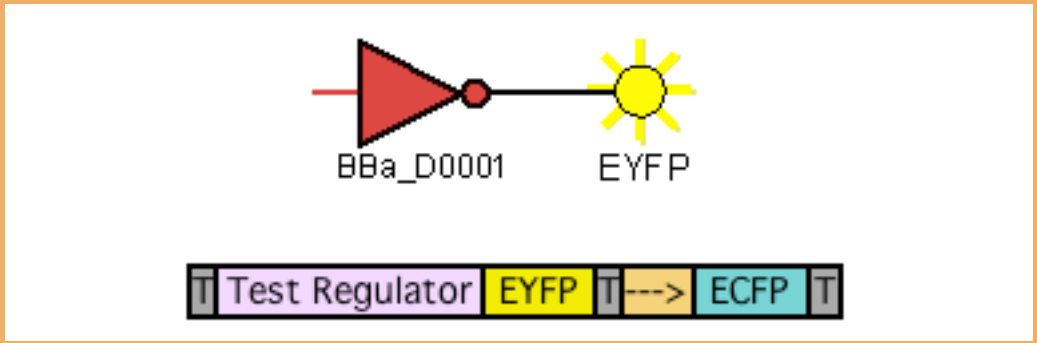
Protein Degradation Tail

the transfer curve

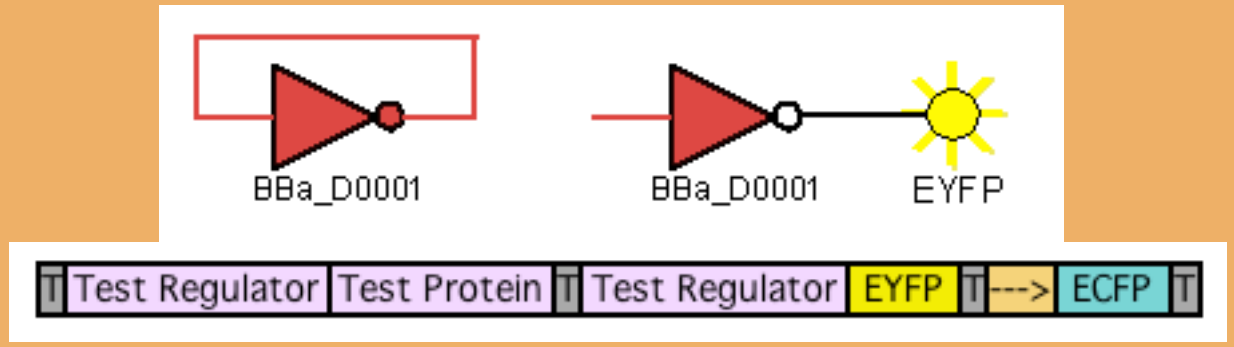
low output measurement

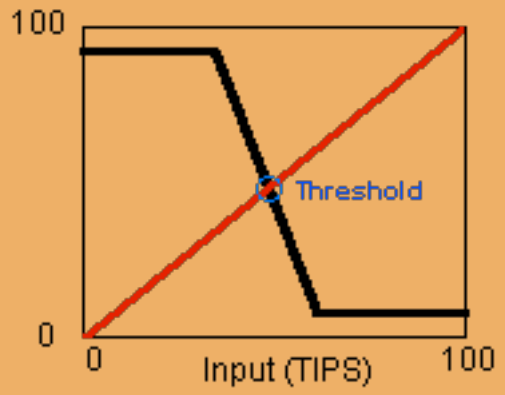


high output measurement

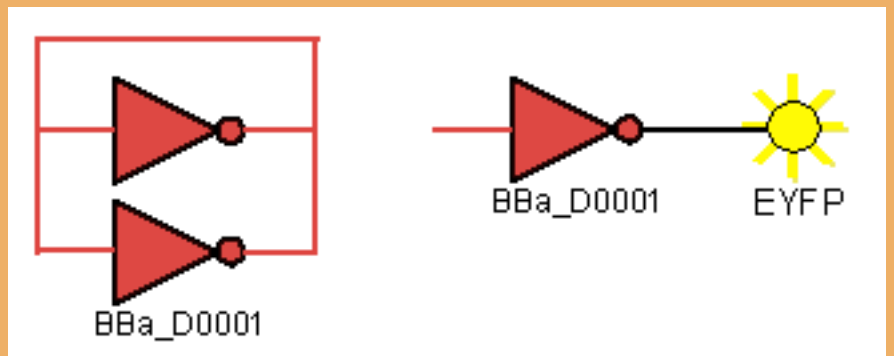


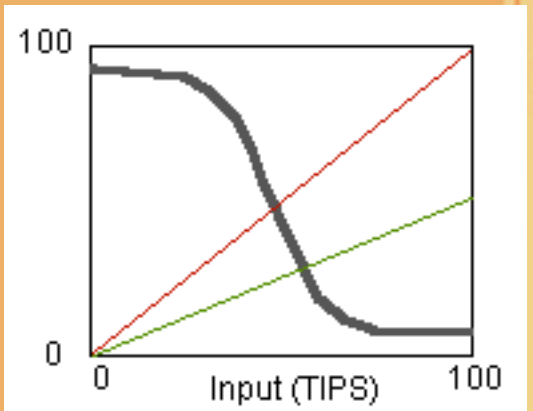
threshold measurement

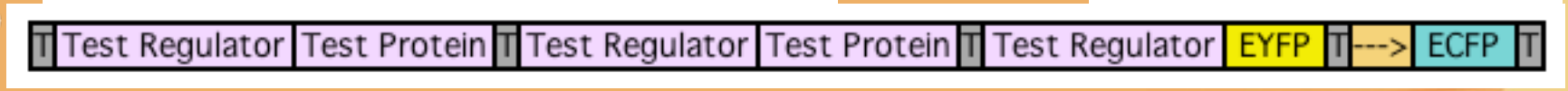




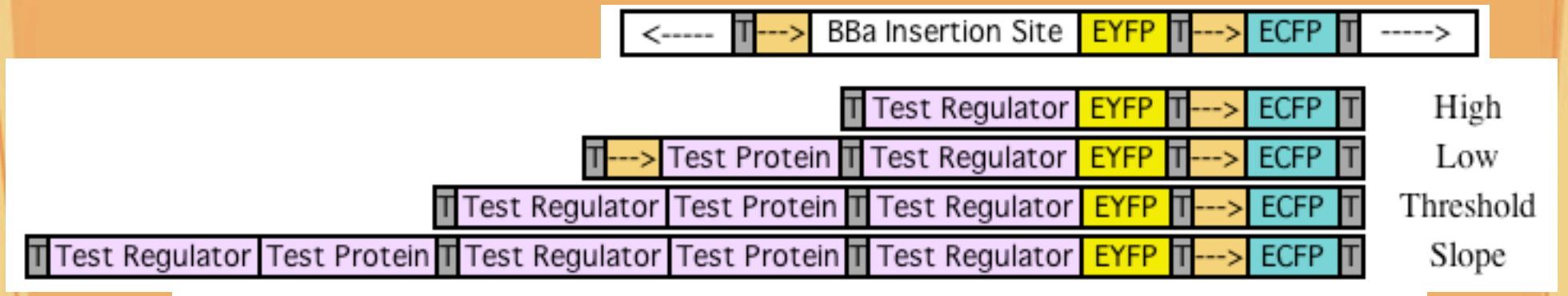
slope measurement

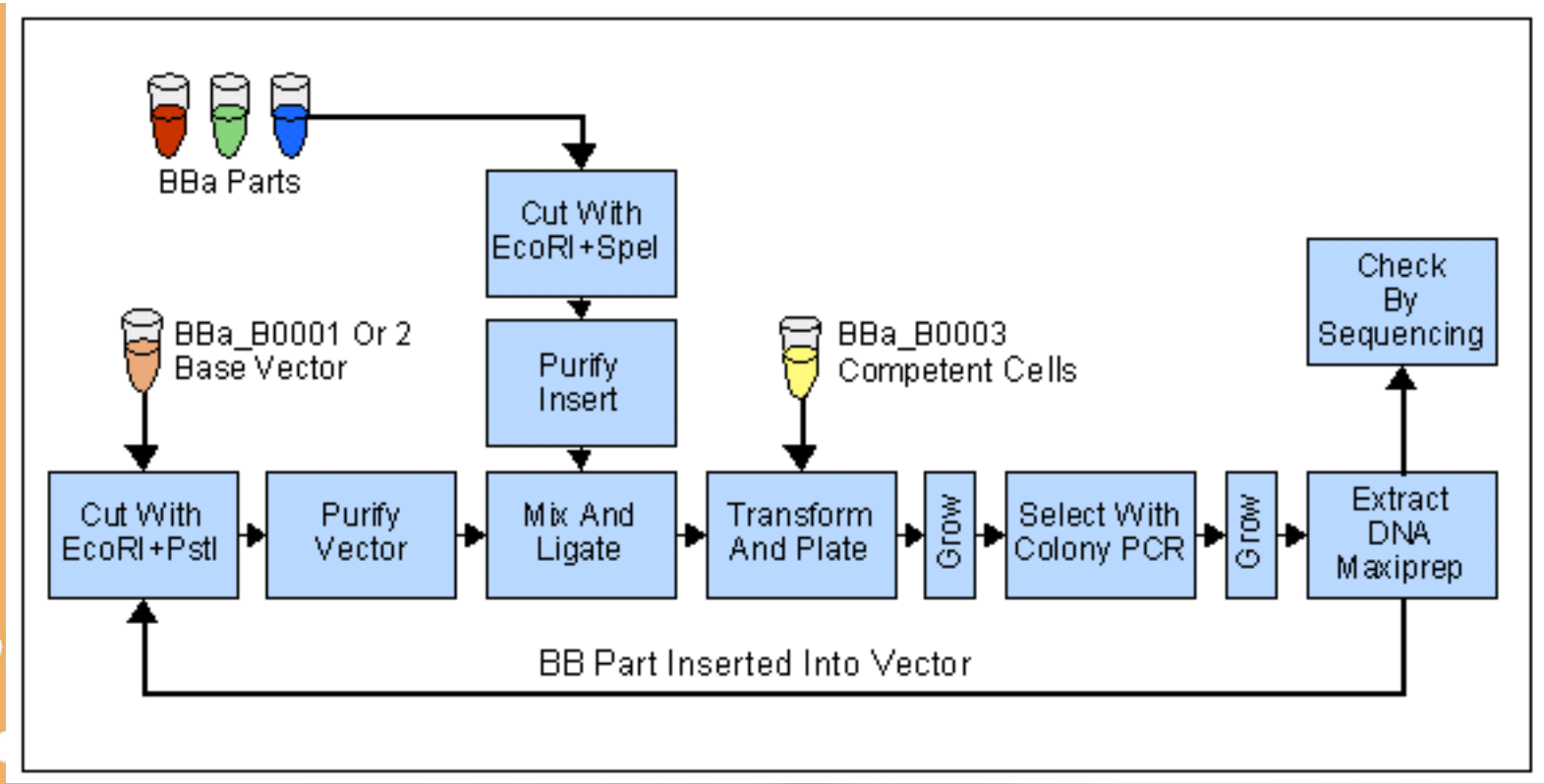






BioBrick Standard Assembly





Verison 0.

BioBrick Enzymes

EcoR I	G|AATTC CTTAA|G
Pst I	CTGCA|G G|ACGTC
Spe I	A|CTAGT TGATC|A
Xba I	T|CTAGA AGATC|T
Not I	GC|GGCCGC CGCCGG|CG
Spe I / Xba I	ACTAGA TGATCT

Step 1 - Designing the Contents

CONTENTS

Step 2 - Adding the Prefix and Suffix

cctt	XbaI	g	CONTENTS	t	SpeI	a	NotI	PstI	cctt

PREFIX Primer

cctttctagag

11 bp

SUFFIX Primer

tactagtagcggccgctgcagcctt

25 bp

Step 3 - The BioBrick Base Vector

--gca	EcoRI	NotI	t	XbaI	gt	SpeI	a	NotI	PstI	gct--

--gca	EcoRI	NotI	t	XbaI	g	CONTENTS	t	SpeI	a	NotI	PstI	gct--

or direct synthesis

Complete PREFIX

gaattcgcggccgcttctagag

22 bp

Complete SUFFIX

tactagtagcggccgctgcag

21 bp

Ribosome Binding Sites

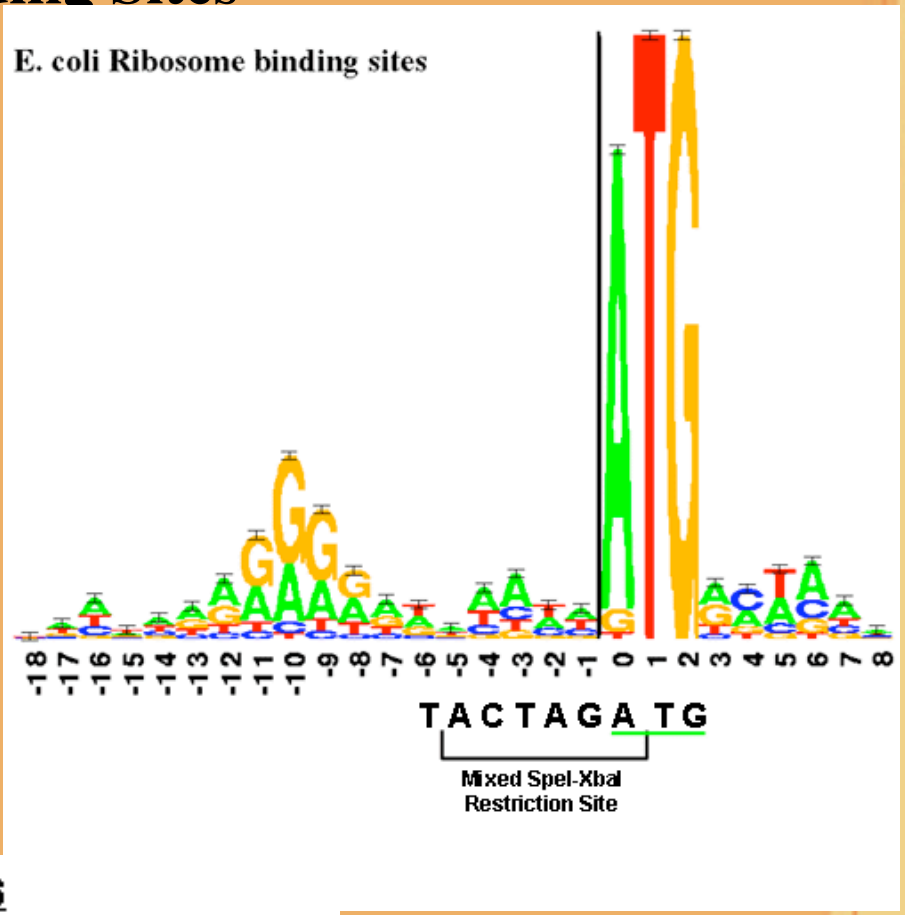
Part Number
Binding
Efficiency
Sequence

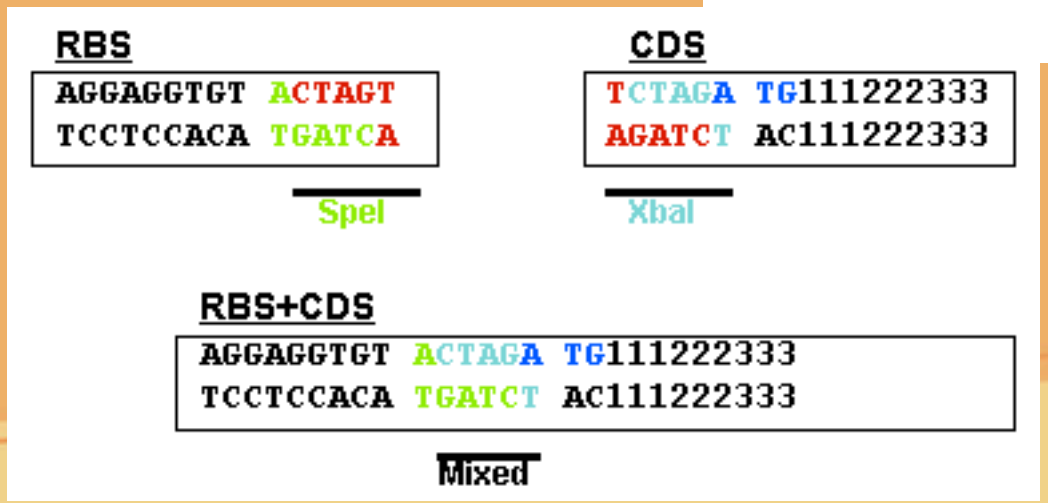
BBa

1.0
ggg aaa agg agg tgt-tactag-atg

BBa
0.84
ggg aaa agg tgg tgt-tactag-atg

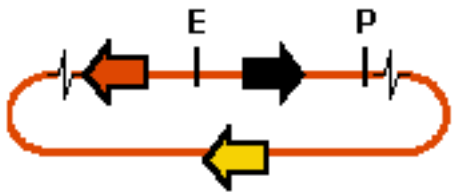
BBa
0.73
ggg aaa agg



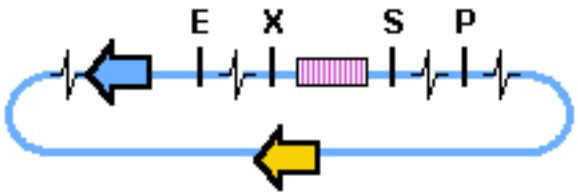


Verison 1. Antibiotic Assembly

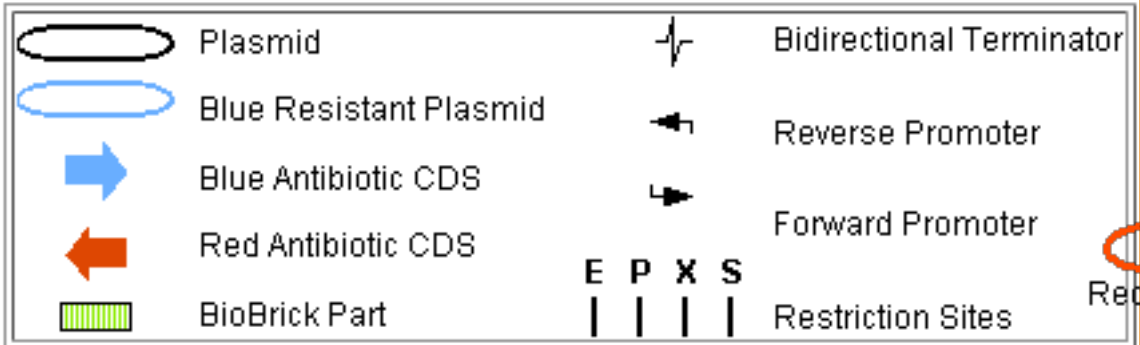
. The total time required for a single stage of standard assembly is likely to be about 4 days.
We estimate that a single stage of assembly based on selection could be performed in one day.



Red, Green, or Blue Construction Plasmid

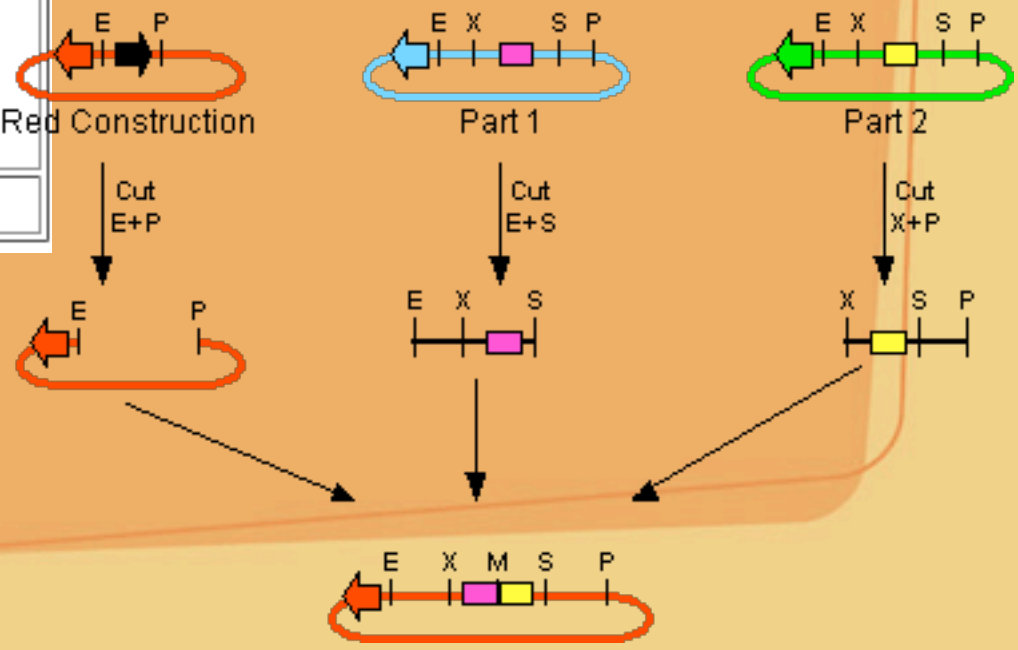


Part In Red, Green, or Blue Plasmid



Key For Figures

Spectinomycin, Kanamyacin, and Chloramphenicol

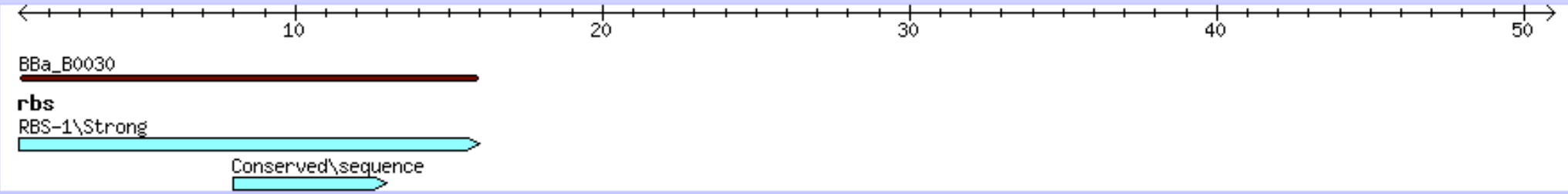


Part Index

Brick	Type	Description	Status	Lengt
B0010	Terminator	Terminator, Transcription (T1)	Available	80
B0011	Terminator	Terminator, Transcription (luxICDABEG bidirectional)	Available	46
B0012	Terminator	Terminator, Transcription (T7 TE)	Available	41
B0013	Terminator	Terminator, Transcription (T7 TE bidirectional)	Available	47
B0014	Terminator	Terminator, Transcription (B0012, B0011)	Available	95
B0015	Terminator	Terminator, Transcription (B0010, B0012)	Available	130
B0016	Terminator	Terminator, Transcription (T7 RNAP specific, T_Phi)	Available	92
B0017	Terminator	Terminator, Transcription (B0010, B0010)	Available	168
B0020	Terminator	Terminator, Transcription (Reverse T1)	Building	
B0021	Terminator	Terminator, Transcription (LuxICDABEG bidirectional)	Available	46
B0022	Terminator	Terminator, Transcription (Reverse TE)	Available	84
B0023	Terminator	Terminator, Transcription (Reverse T7 Bidirectional)	Available	90
B0024	Terminator	Reverse double Terminator (from B0014)	Available	
B0025	Terminator	Reverse double Terminator (from B0015)	Available	
B0030	RBS	RBS.1 (strong)	Available	15
B0031	RBS	RBS.2 (medium)	Available	14
B0032	RBS	RBS.3 (weak)	Available	13
B0033	RBS	RBS.4 (weaker -- test)	Available	11
B0034	RBS	RBS.5 (Elowitz RBS)	Available	12
B0035	RBS	RBS (non-standard SD sequence)	Planning	8
B0040		Spacer.1 (generic)	Available	70

RBS.1 (strong)	Available

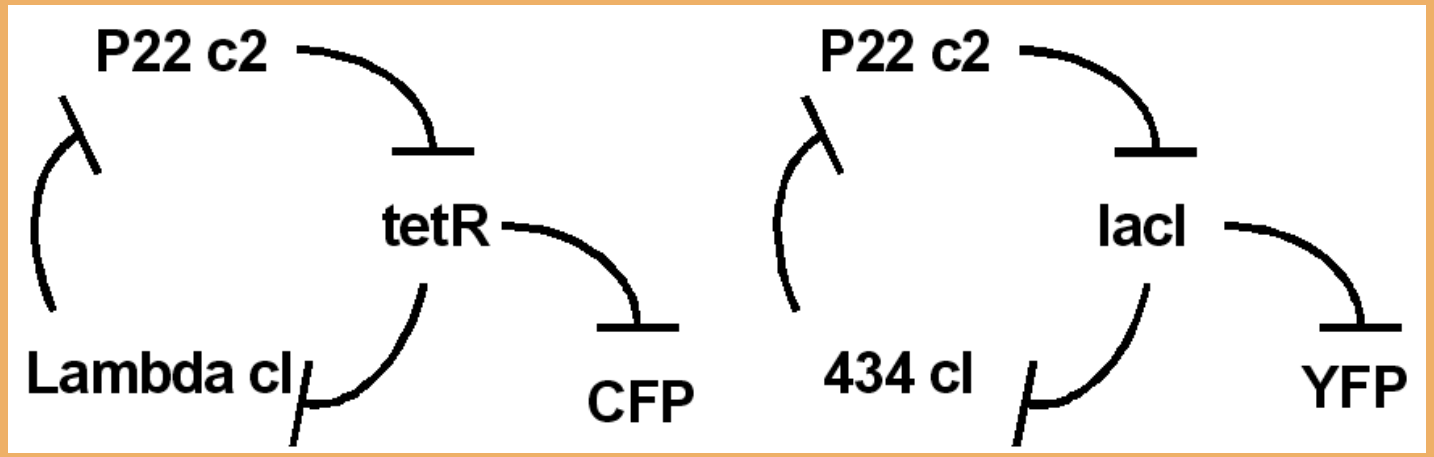
Description	Strong RBS based on Ron Weiss thesis. Strength is considered relative to BBa_B0031, BBa_B0032, BBa_B0033.
Sequence	Get Sequence · Redraw With: Part Only

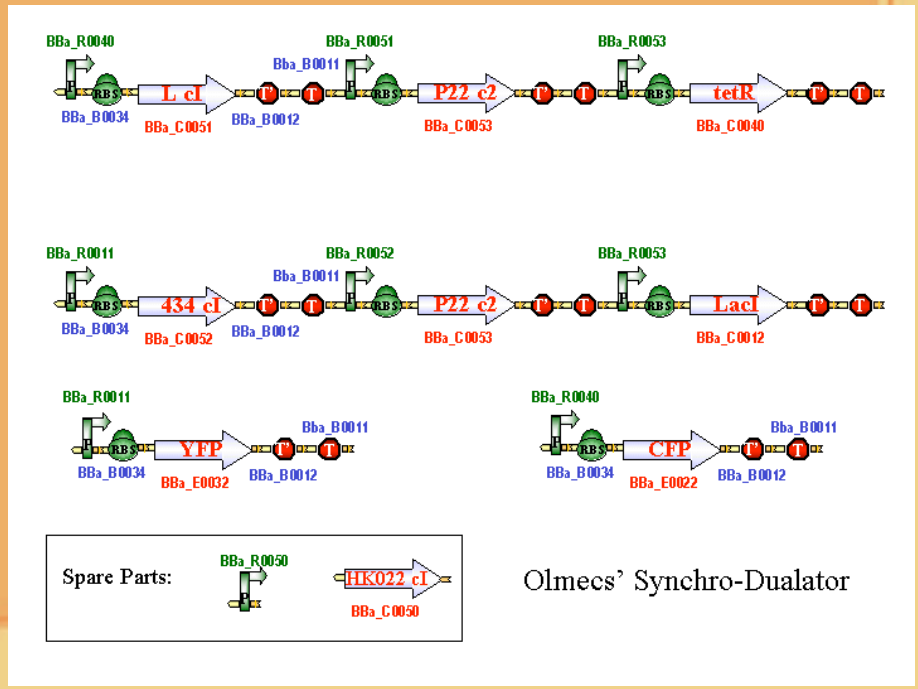



```
   1          11     21 31 41 51 61 71 81 91
1  attaaagagg agaaa
   taatttctcc tcttt
```

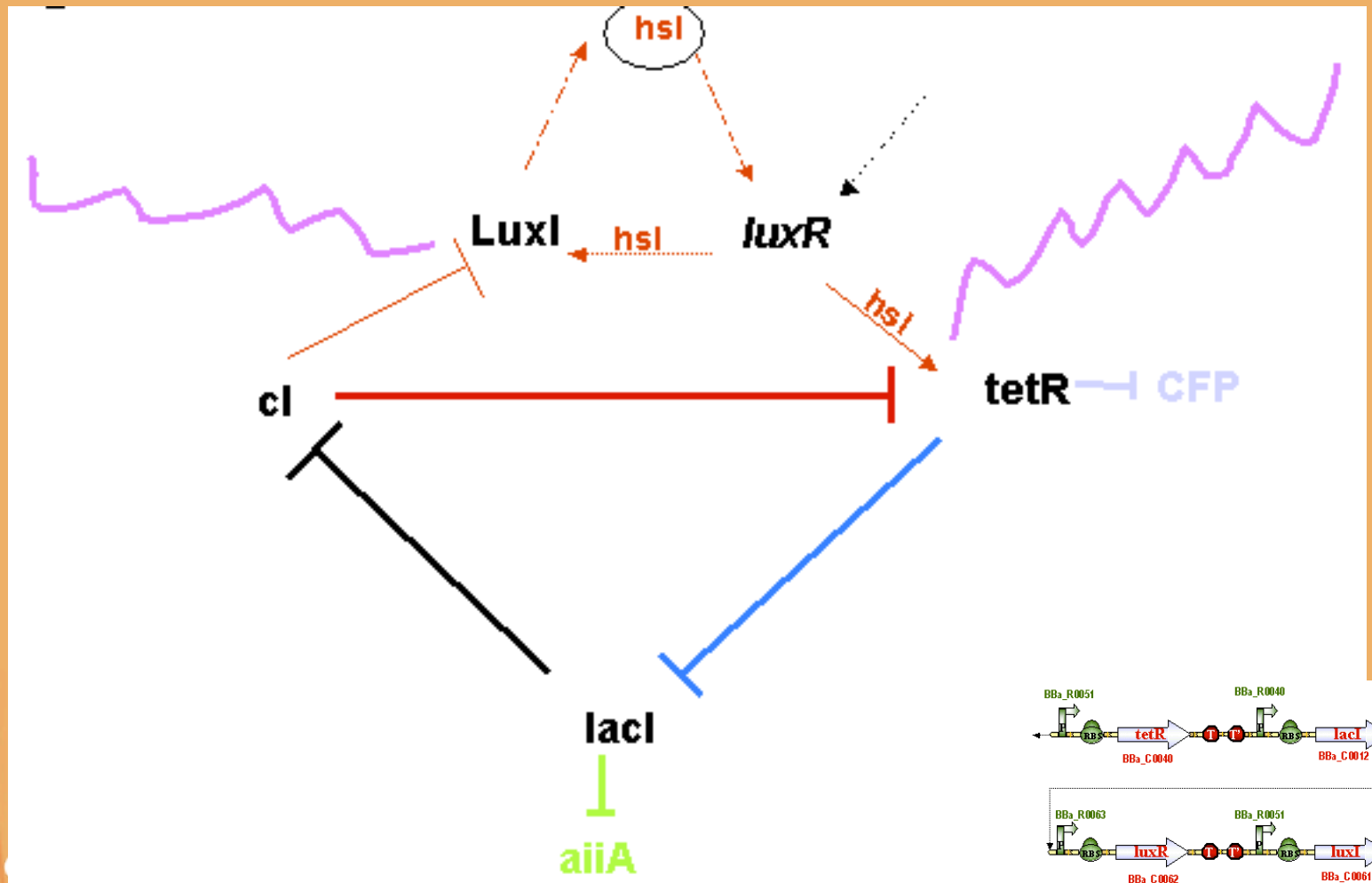
Crosslinks & Compatibility	**Other Part Linked Compatible Notes**
Lengths	Part Only | 15 | Vf-Vr
Source	
Biology	
Properties	**Chassis Property Typical Min Max Units**
Notes	Varies from -6 to +1 region from original sequence to accomodate BioBricks suffix ("orig" in figure 4-14 of Ron Weiss thesis). No secondary structures are formed in the given RBS region. Users should check for secondary structures induced in the RBS by upstream and downstream elements in the +50 to -50 region, as such structures will greatly affect the strength of the RBS.
Inventory	**Location Amount Units Form Prod. Date Notes**
Files	
Designer(s)	Constructed by Vinay S Mahajan, Voichita D. Marinescu, Brian Chow, Alexander D Wissner-Gross and Peter Carr IAP, 2003. Contact info Brian Chow
Check Log	Add

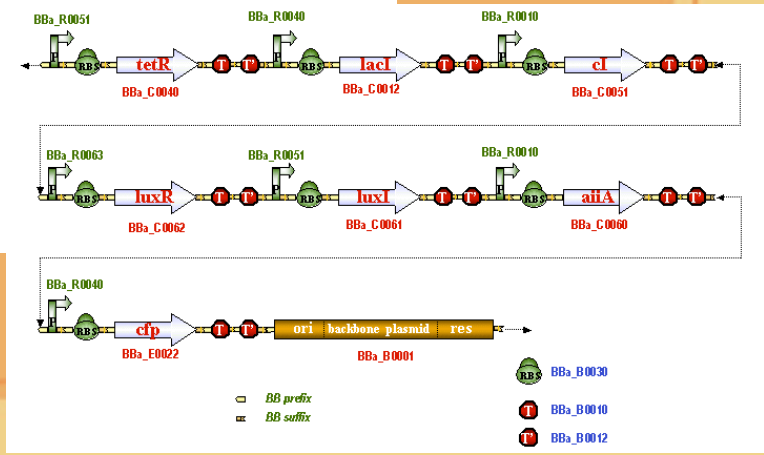
better autocorrelation than the repressilator



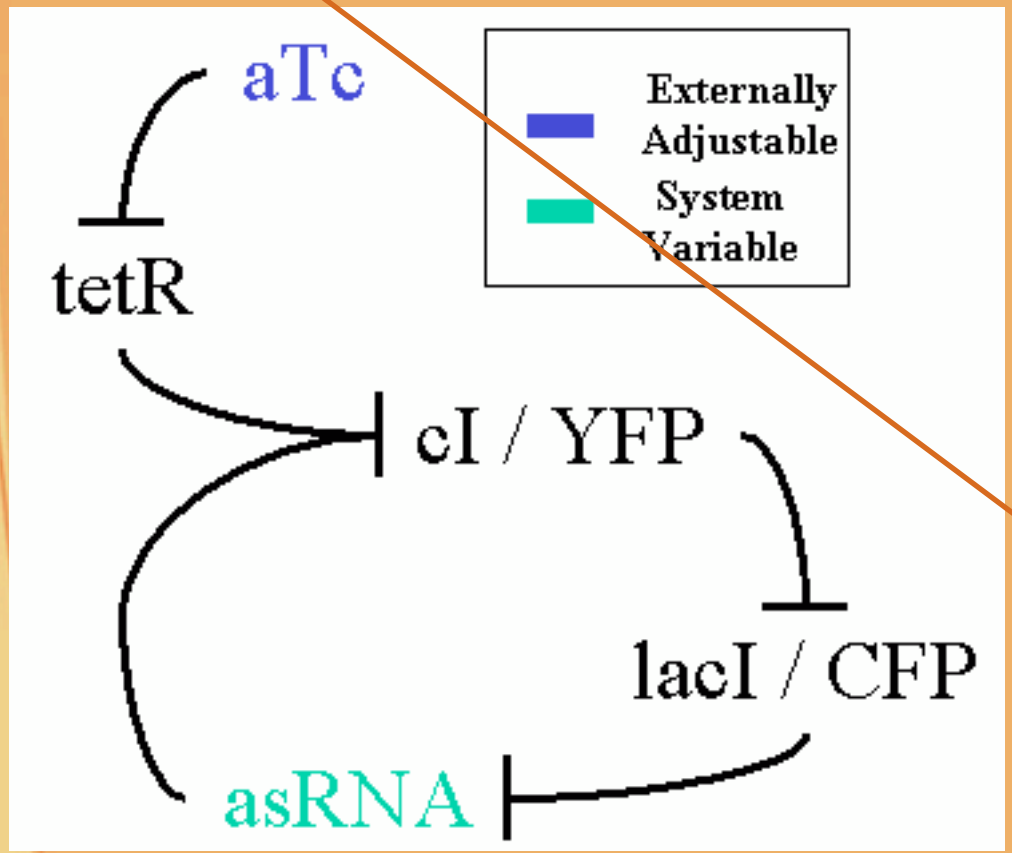


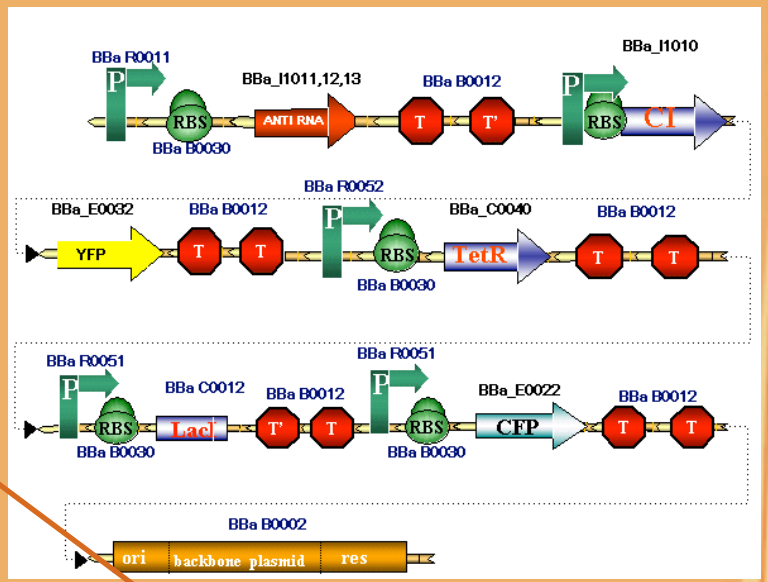
Synchronization of a repressilator

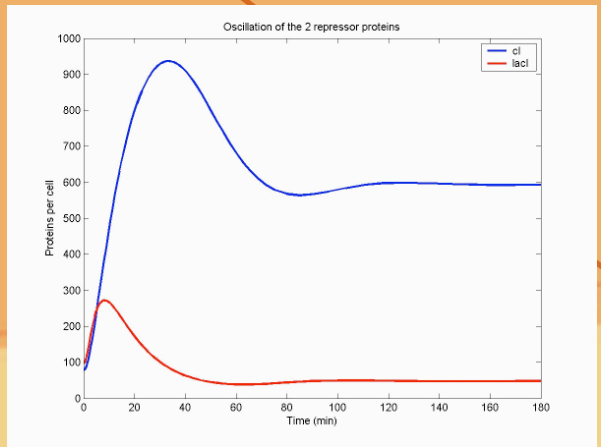




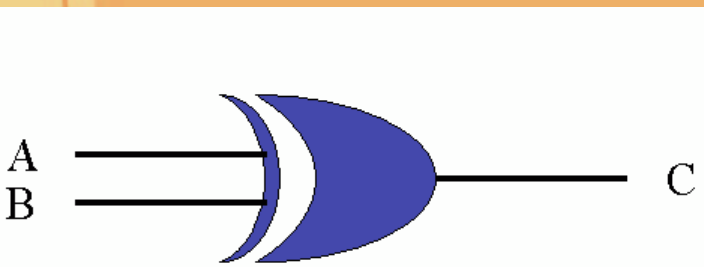
decreasing the period using an anti-sense RNA interference



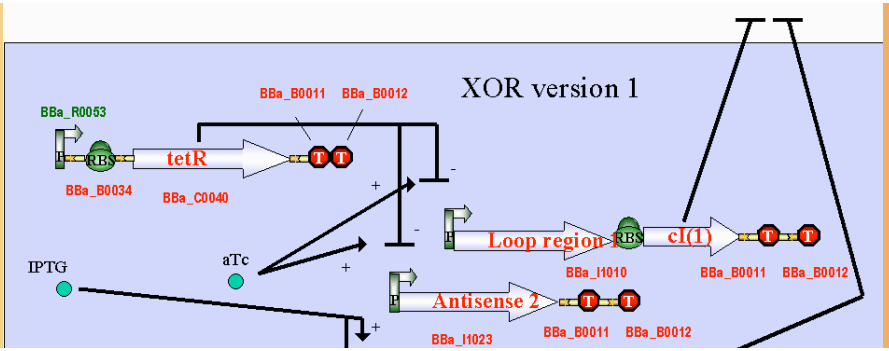


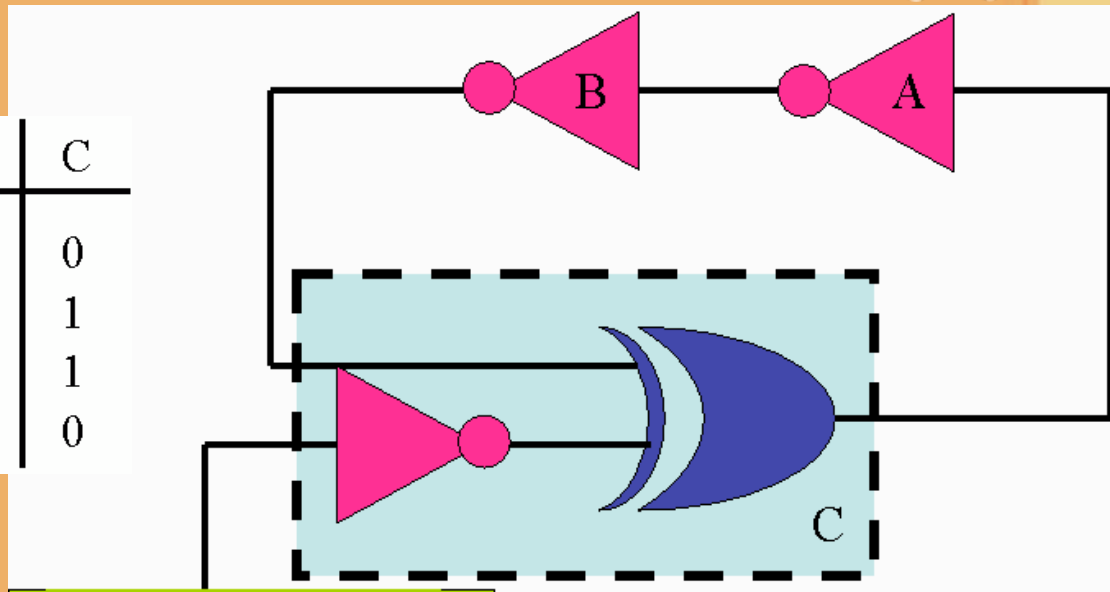


XOR gate using antisense inhibition strategies



A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

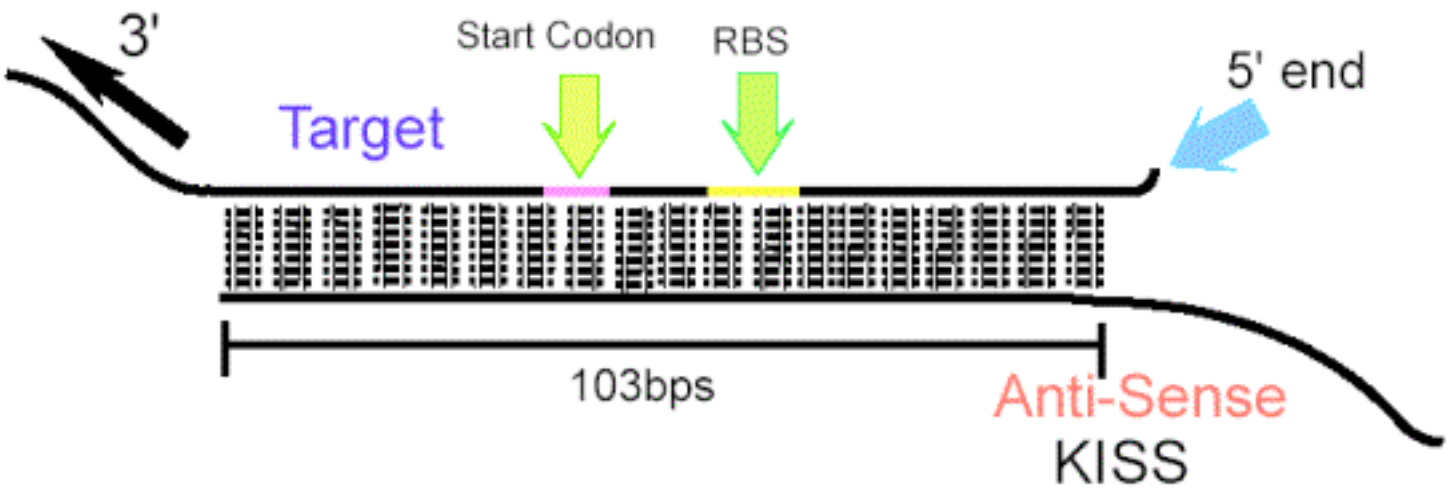




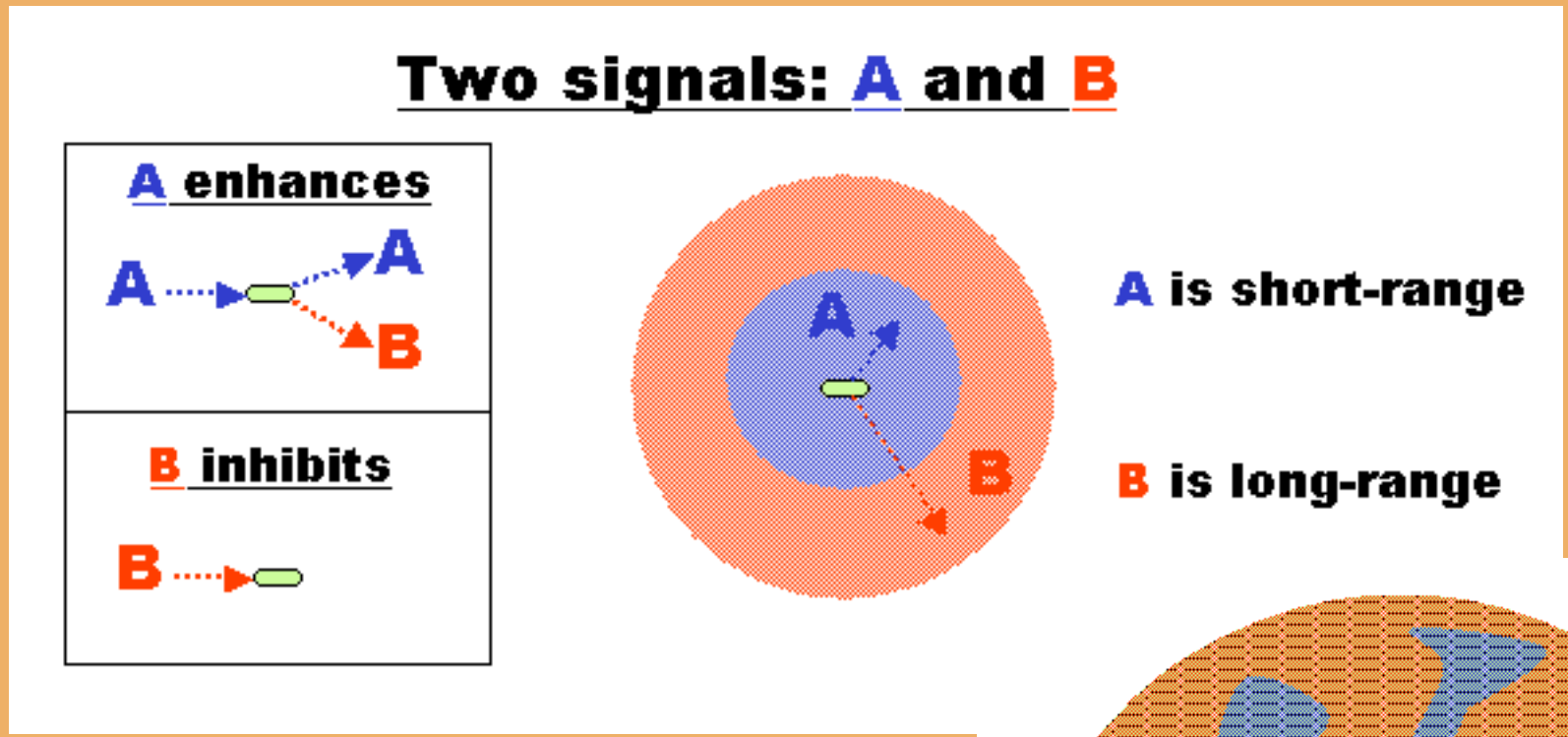
D: External input

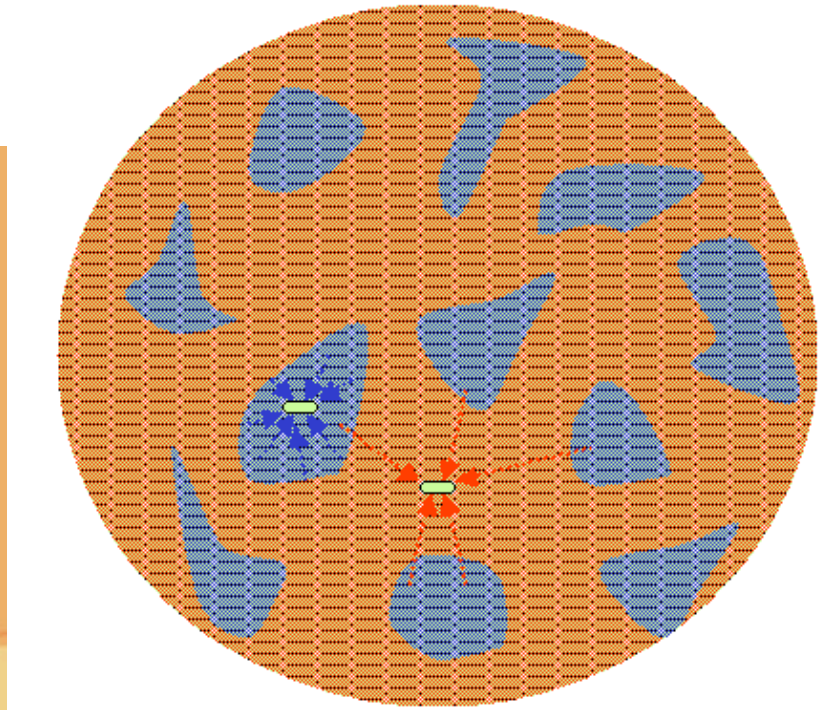
0 Repressilator

1 Latch

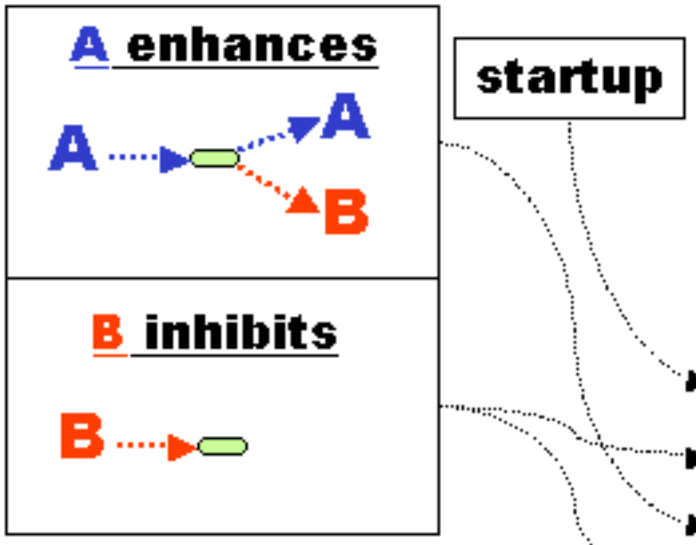


create polka dot patterns in colonies of bacteria cells





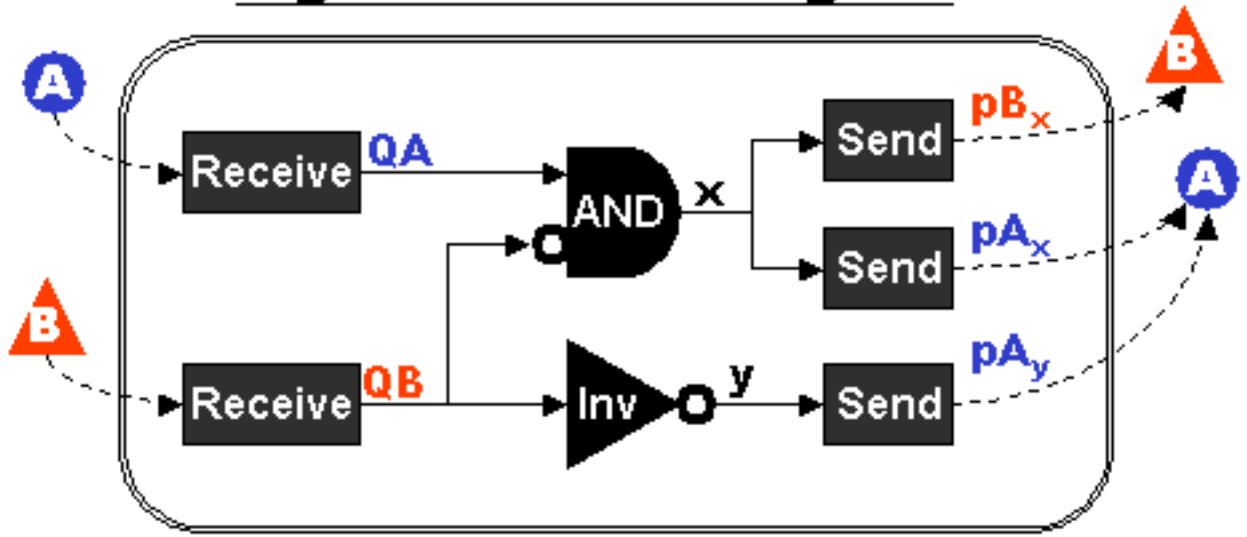
Cell truth table



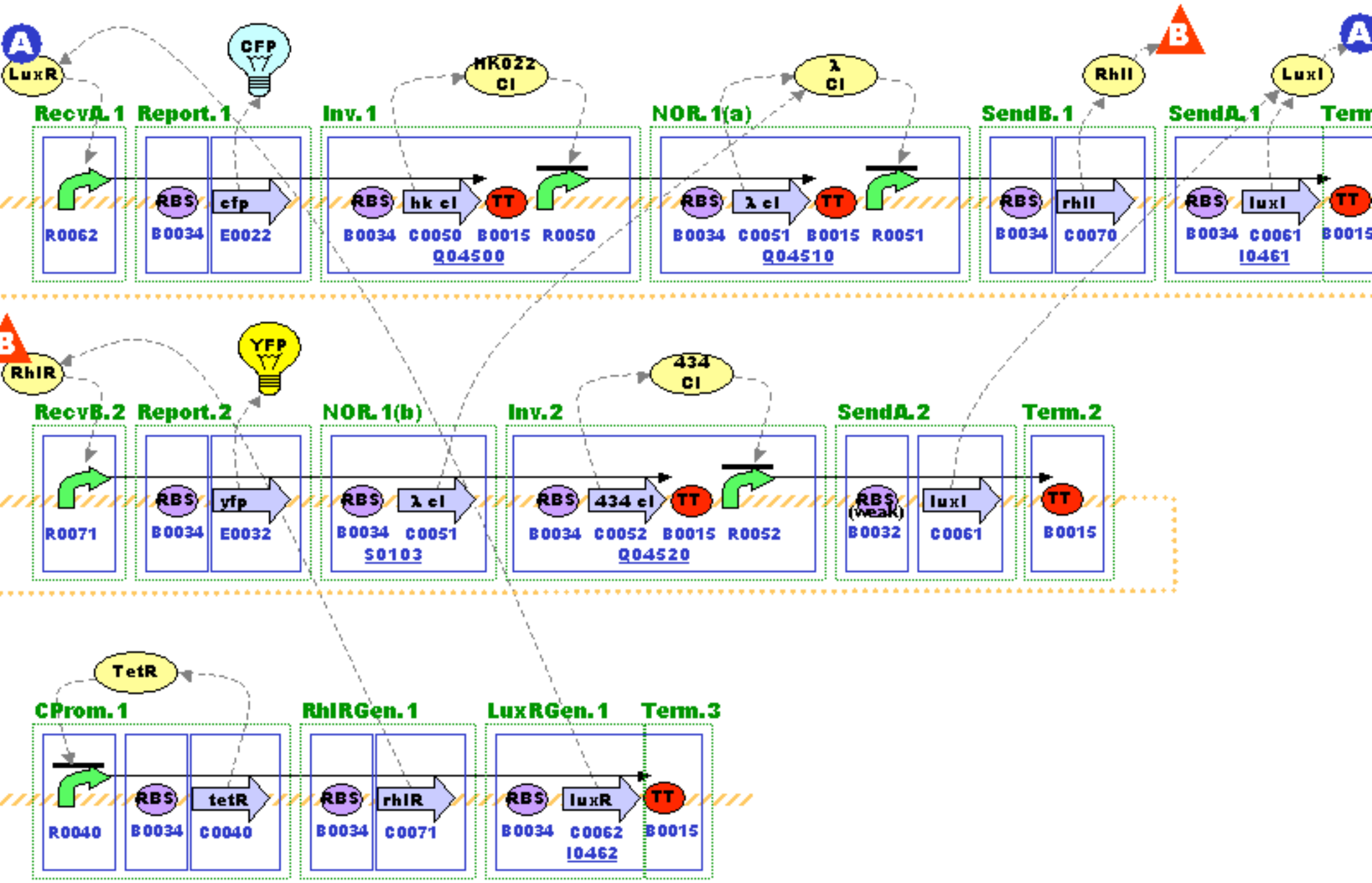
startup

Inputs (quorum signals)		Outputs (production rates)		Gates (in block-diagram)	
QA	QB	pA	pB	AND x	Inv y
0	0	pA_{00}	0	0	1
0	1	0	0	0	0
1	0	pA_{10}	pB_{10}	1	1
1	1	0	0	0	0

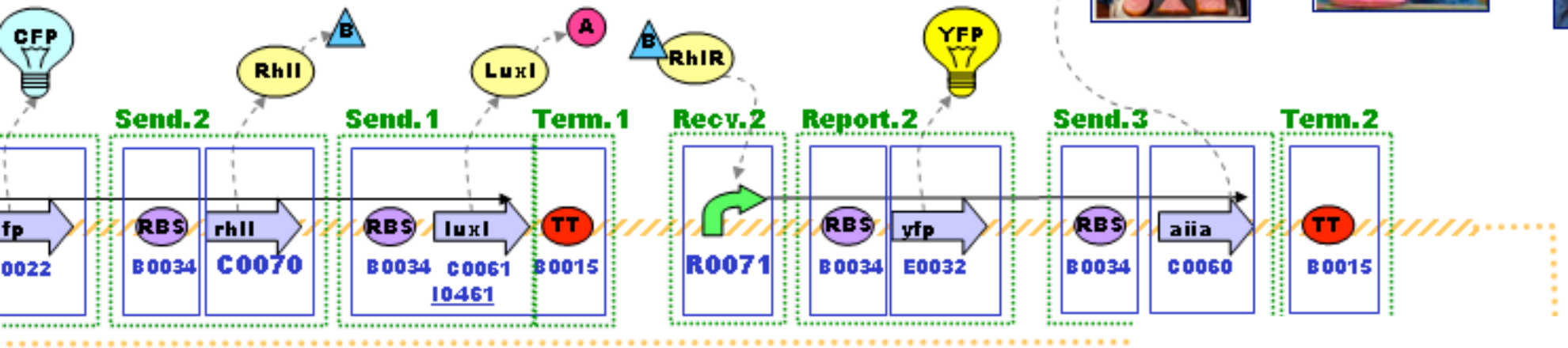
High-level block diagram

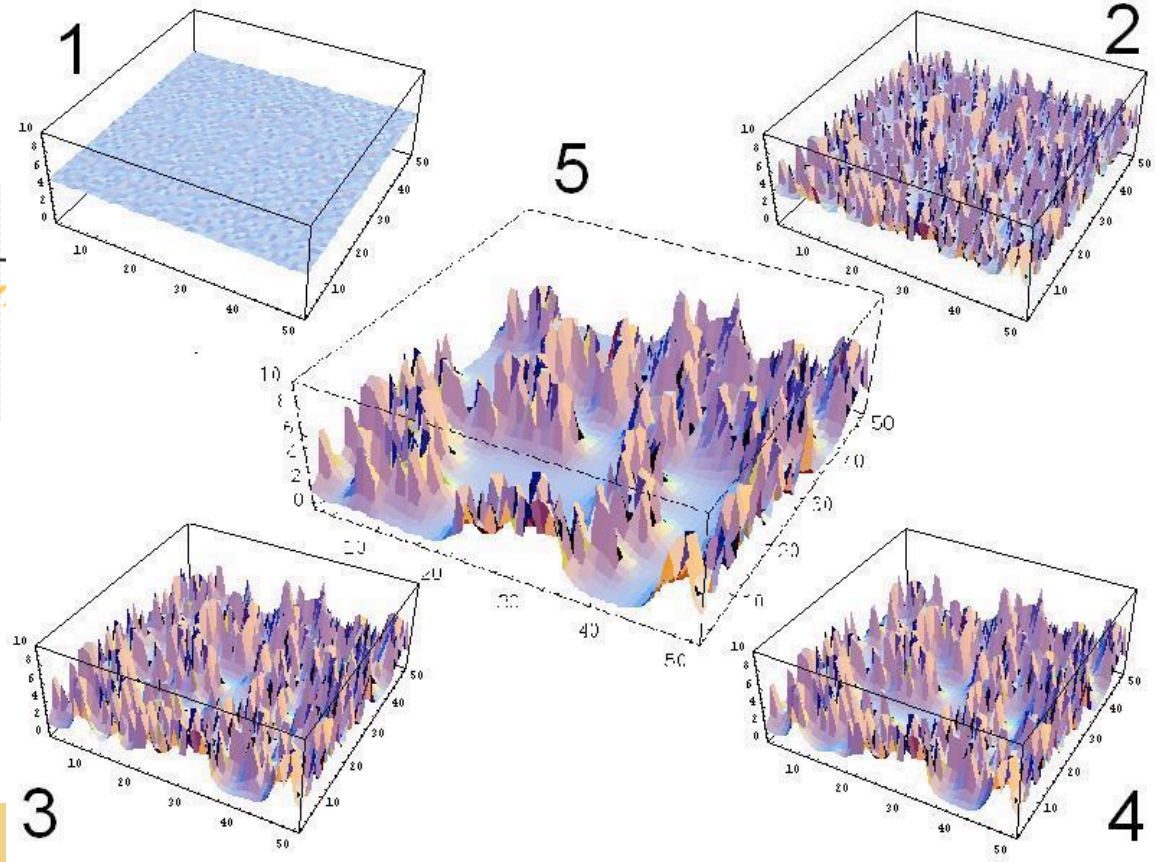


$pA_{00} = pA_y$
$pA_{10} = pA_x + pA_y$
$pB_{10} = pB_x$

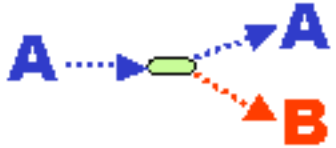

A
LuxR
CFP
HK022 CI
λ CI
RhlI
B
LuxI
A
RecvA.1
Report.1
Inv.1
NOR.1(a)
SendB.1
SendA.1
Term
R0062
RBS
B0034
cfp
E0022
RBS
B0034
hk cI
TT
B0015
R0050
Q04500
RBS
B0034
λ cI
TT
C0051
B0015
R0051
Q04510
RBS
B0034
rhlI
C0070
RBS
B0034
luxI
C0061
I0461
TT
B0015
B
RhlR
YFP
434 CI
RecvB.2
Report.2
NOR.1(b)
Inv.2
SendA.2
Term.2
R0071
RBS
B0034
yfp
E0032
RBS
B0034
λ cI
C0051
S0103
RBS
B0034
434 cI
TT
C0052
B0015
R0052
Q04520
RBS
(weak)
B0032
luxI
C0061
TT
B0015
TetR
CProm.1
RhlRGen.1
LuxRGen.1
Term.3
R0040
RBS
B0034
tetR
C0040
RBS
B0034
rhlR
C0071
RBS
B0034
luxR
C0062
I0462
TT
B0015

AIIA !!



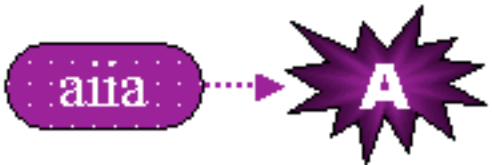


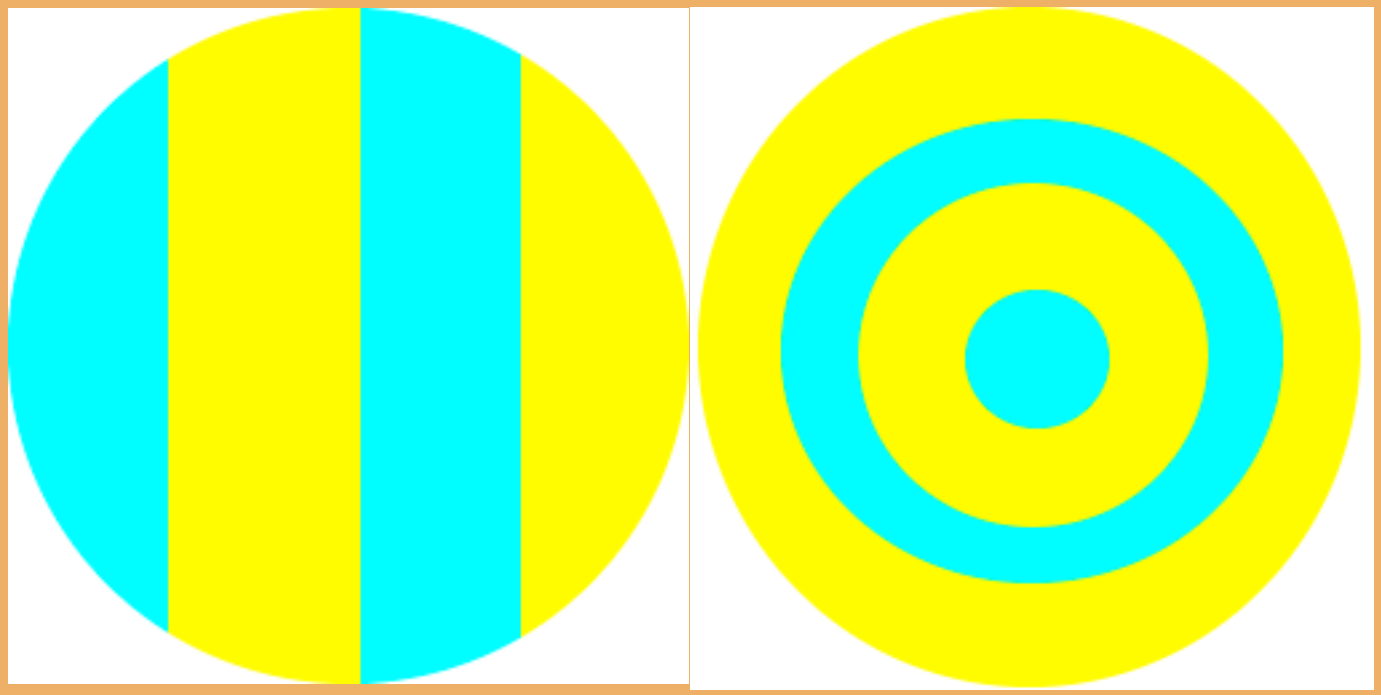
A enhances

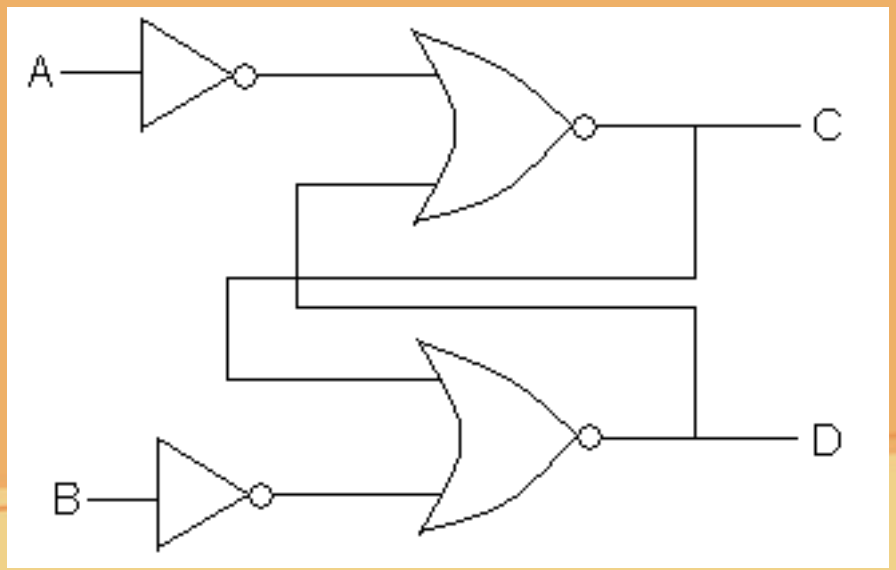


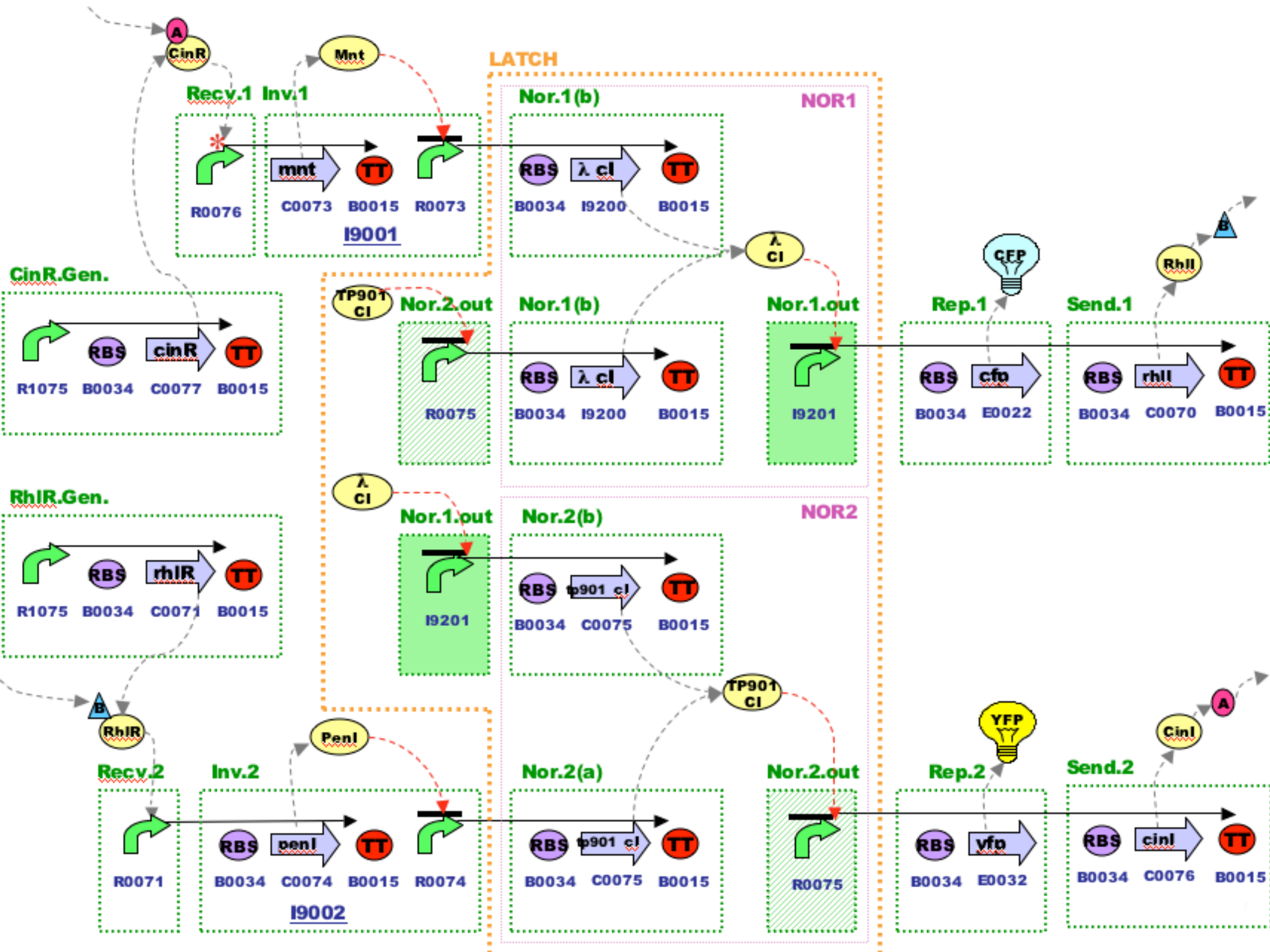
B produces aiia

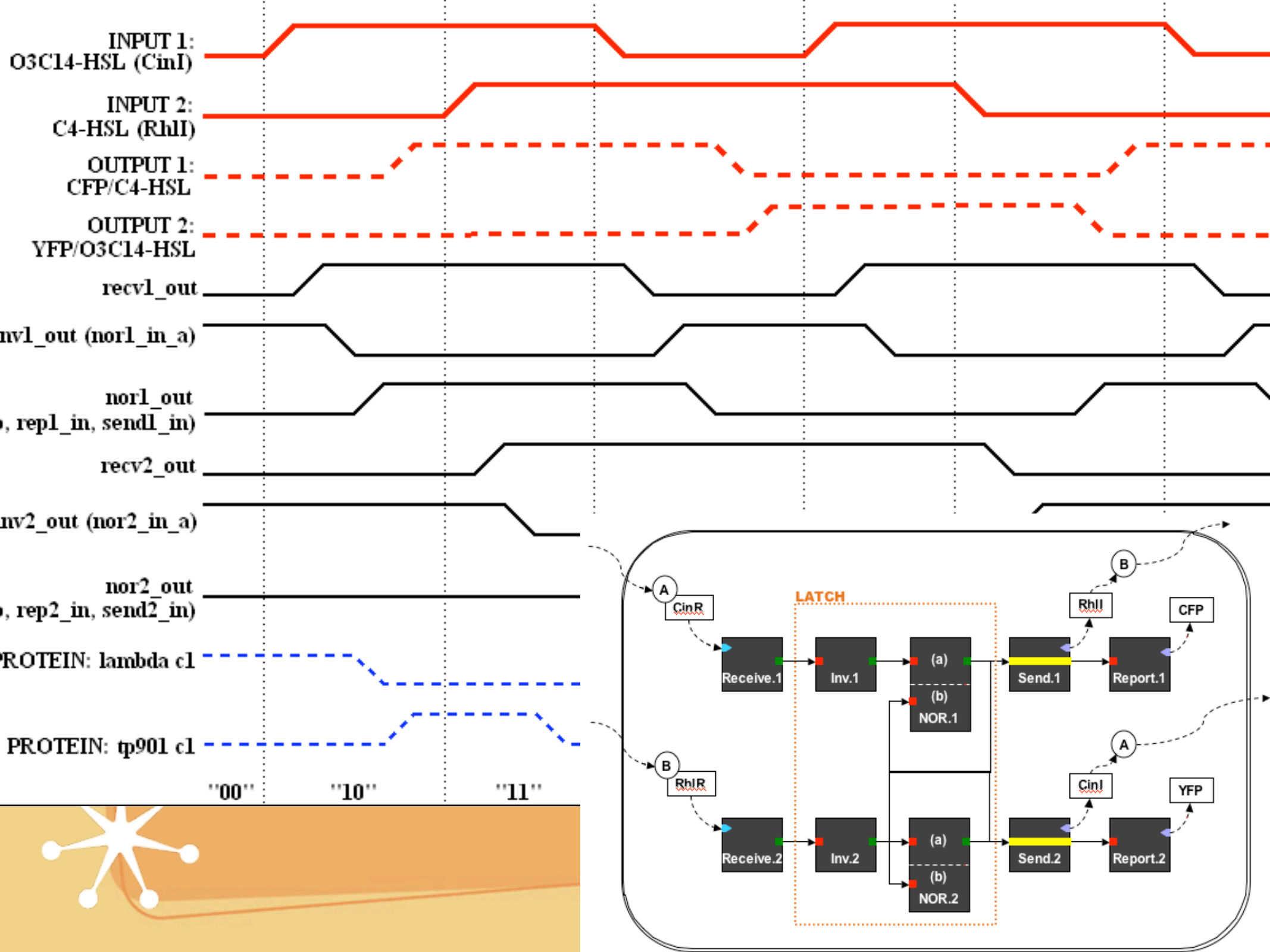
aiia destroys A





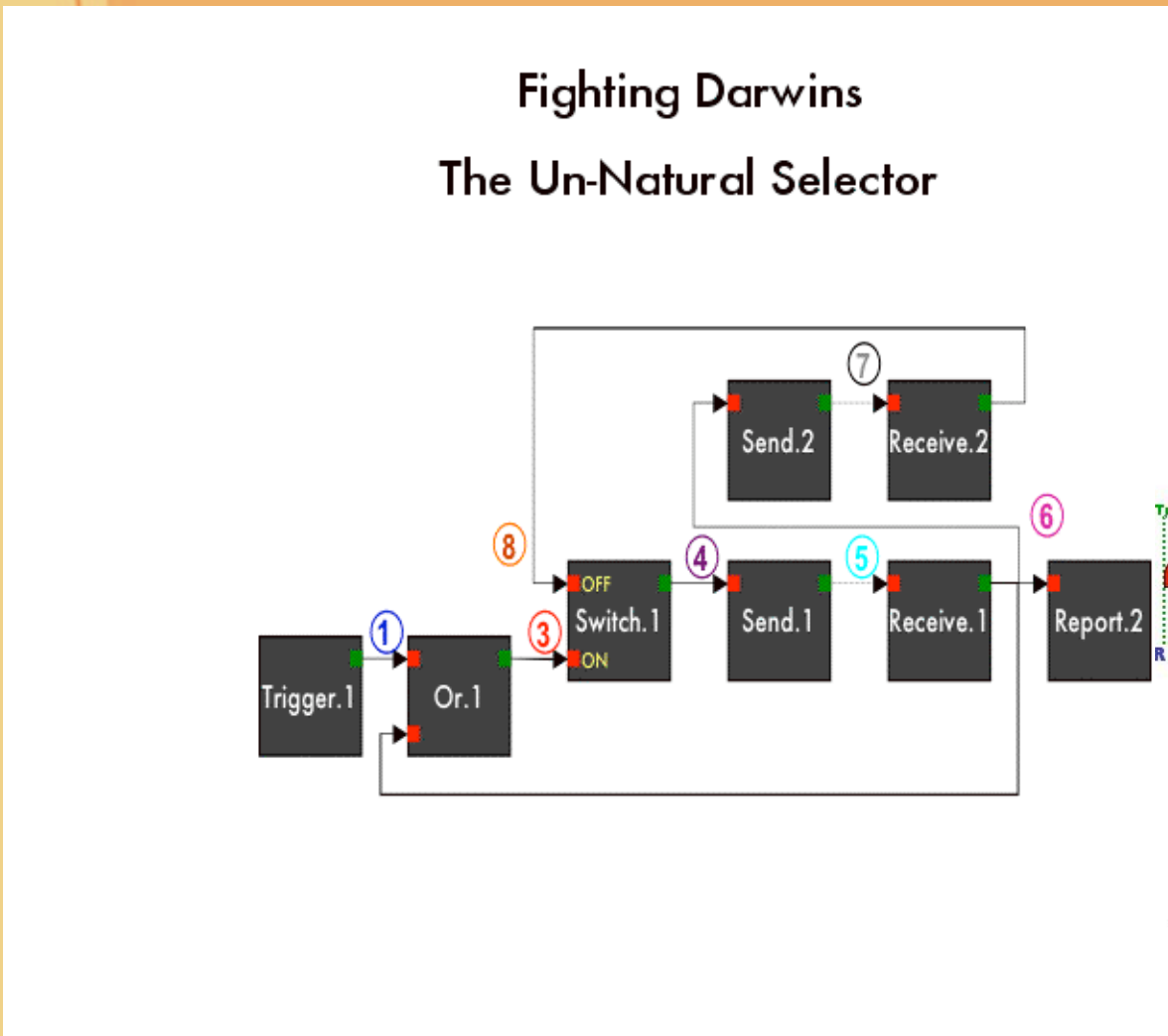

A
C
B
D

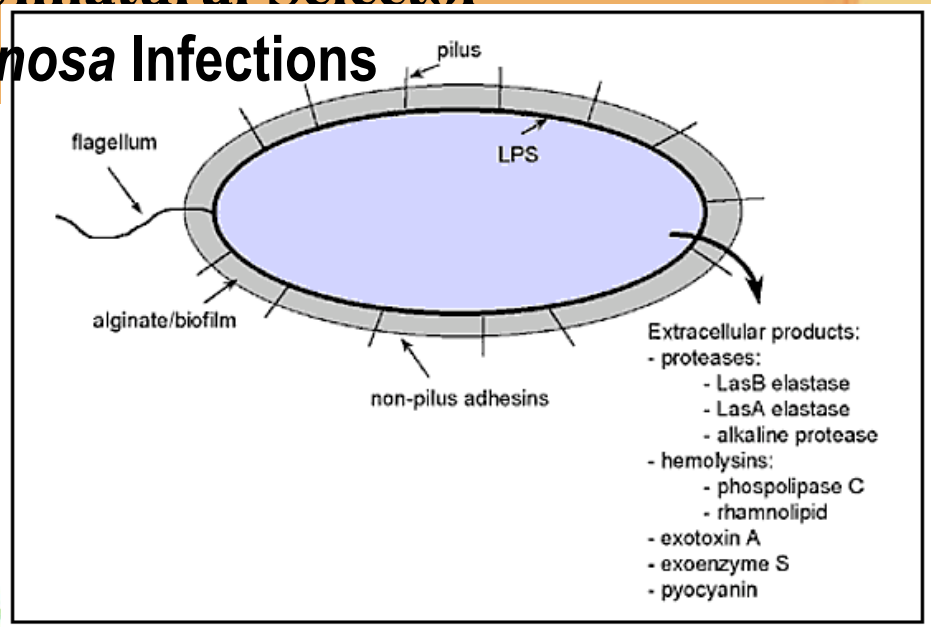

LATCH
NOR1
NOR2
A
CinR
Mnt
Recv.1
Inv.1
R0076
mnt
C0073
B0015
R0073
I9001
Nor.1(b)
RBS
λ cI
B0034
I9200
TT
B0015
λ cI
CinR.Gen.
R1075
B0034
C0077
B0015
cinR
TP901 cI
Nor.2.out
R0075
Nor.1(b)
Nor.1.out
I9201
CFP
Rep.1
cfp
E0022
Send.1
RhlI
B
rhlI
C0070
RhlR.Gen.
C0071
rhlR
Nor.2(b)
tp901 cI
C0075
RhlR
PenI
Recv.2
Inv.2
R0071
penI
C0074
R0074
I9002
Nor.2(a)
YFP
Rep.2
yfp
E0032
Send.2
CinI
cinI
C0076

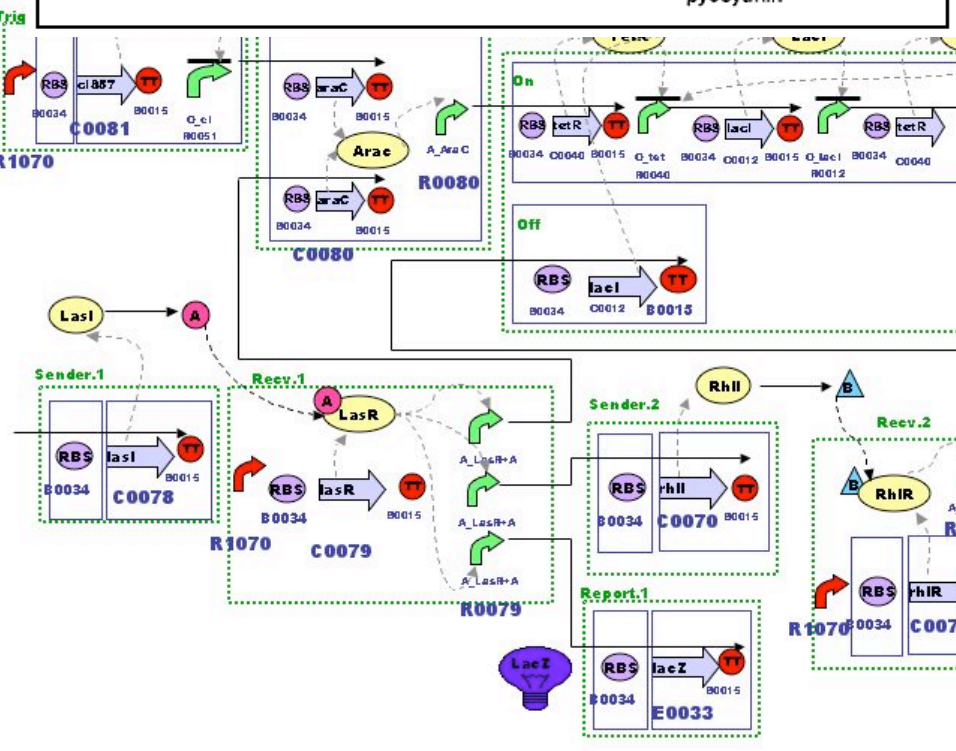

INPUT 1:
O3C14-HSL (CinI)
INPUT 2:
C4-HSL (RhlI)
OUTPUT 1:
CFP/C4-HSL
OUTPUT 2:
YFP/O3C14-HSL
recv1_out
nv1_out (nor1_in_a)
nor1_out
, rep1_in, send1_in)
recv2_out
nv2_out (nor2_in_a)
nor2_out
, rep2_in, send2_in)
ROTEIN: lambda c1
PROTEIN: tp901 c1
"00"
"10"
"11"
A
CinR
B
RhlR
LATCH
Receive.1
Inv.1
(a)
(b)
NOR.1
Send.1
Report.1
RhlI
CFP
Receive.2
Inv.2
NOR.2
Send.2
Report.2
CinI
YFP

Team Fighting Darwins - The Unnatural Selector

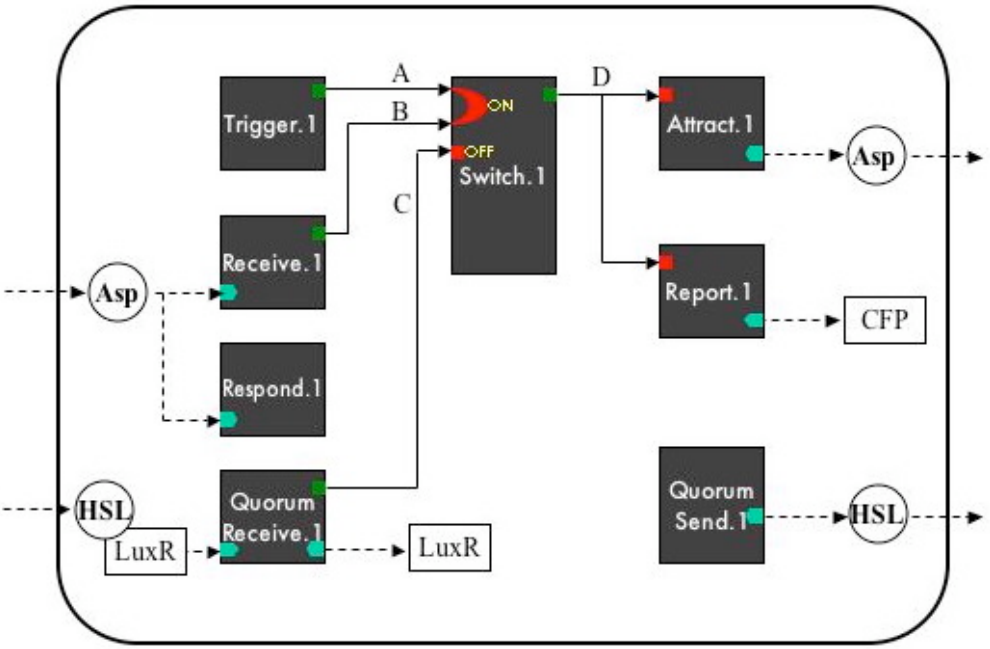
Cell-to-Cell Signaling and *Pseudomonas aeruginosa* Infections

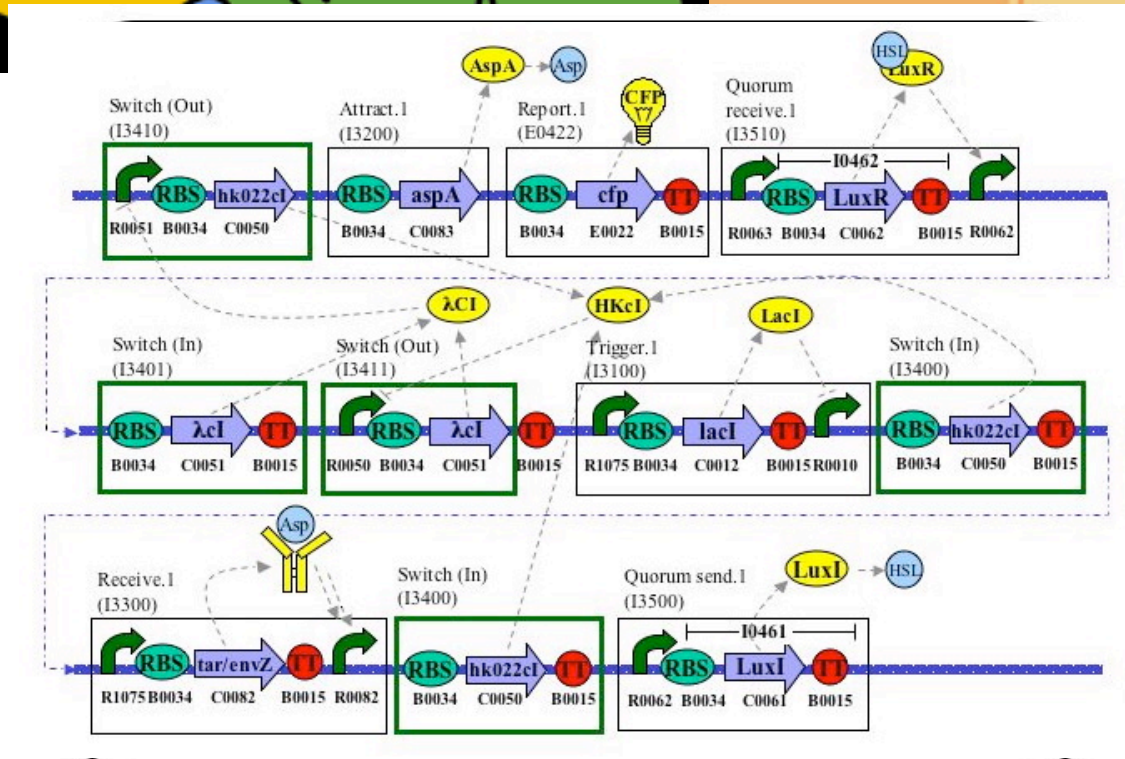


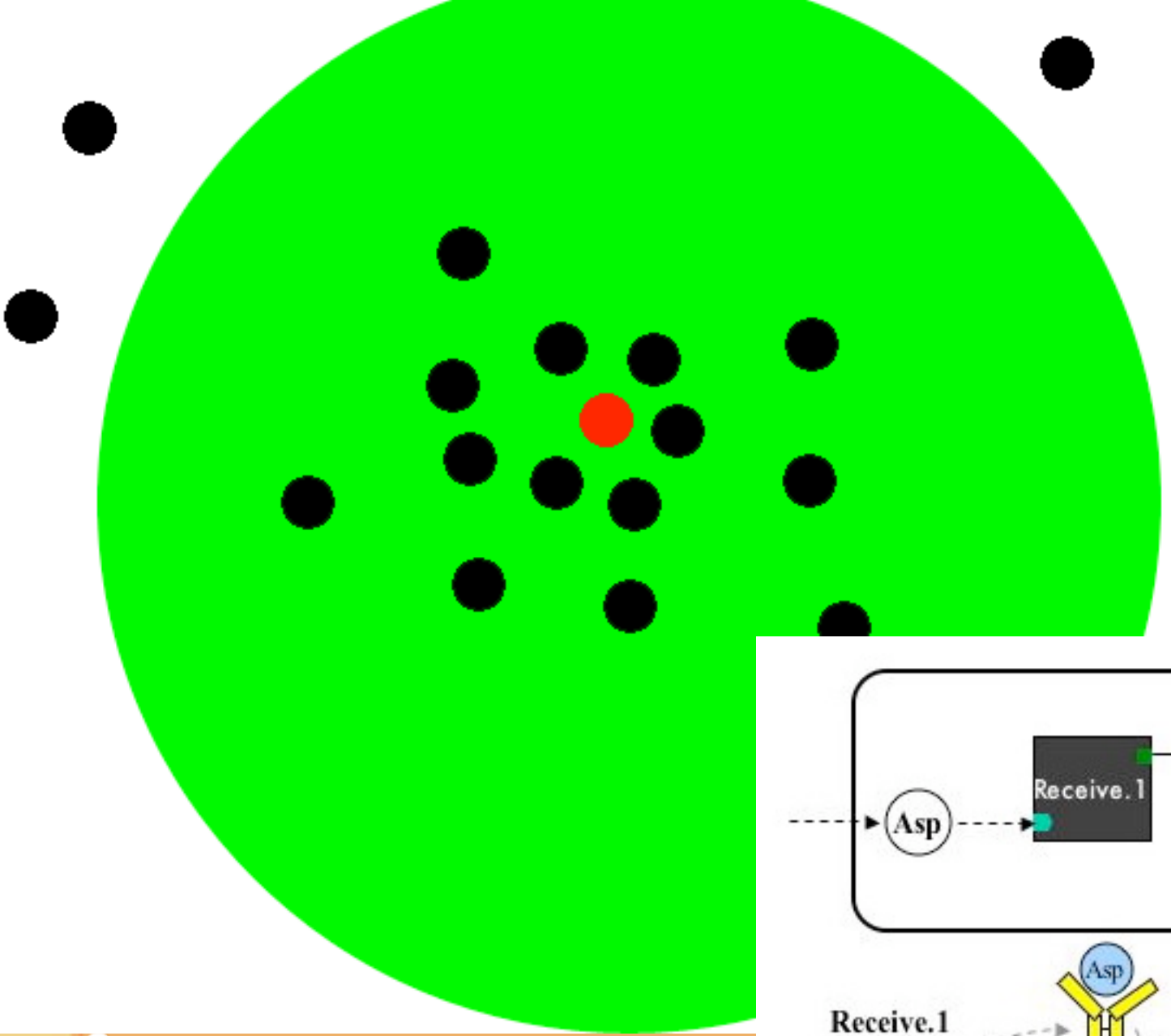


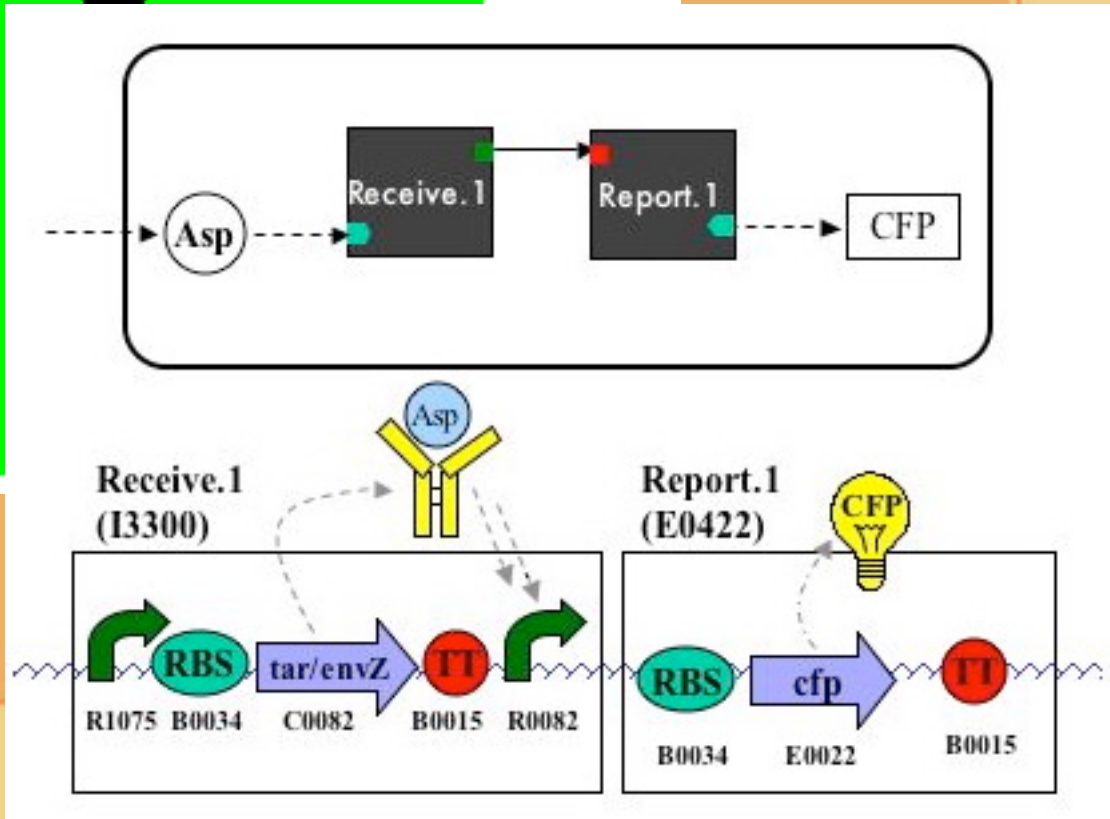



E. coli-brator?
What's that?


Trigger.1
A
B
C
D
ON
OFF
Switch.1
Attract.1
Asp
Receive.1
Report.1
CFP
Asp
Respond.1
HSL
LuxR
Quorum Receive.1
LuxR
Quorum Send.1
HSL


Switch (Out)
(I3410)
RBS hk022cI
R0051 B0034 C0050
Attract.1
(I3200)
RBS aspA
B0034 C0083
AspA
Asp
Report.1
(E0422)
CFP
RBS cfp TT
B0034 E0022 B0015
Quorum receive.1
(I3510)
I0462
RBS LuxR TT
R0063 B0034 C0062 B0015 R0062
HSL
LuxR
λCI
HKcI
LacI
Switch (In)
(I3401)
RBS λcI TT
B0034 C0051 B0015
Switch (Out)
(I3411)
RBS λcI TT
R0050 B0034 C0051 B0015
Trigger.1
(I3100)
RBS lacI TT
R1075 B0034 C0012 B0015 R0010
Switch (In)
(I3400)
RBS hk022cI TT
B0034 C0050 B0015
Asp
Receive.1
(I3300)
RBS tar/envZ TT
R1075 B0034 C0082 B0015 R0082
Switch (In)
(I3400)
RBS hk022cI TT
B0034 C0050 B0015
Quorum send.1
(I3500)
LuxI
HSL
I0461
RBS LuxI TT
R0062 B0034 C0061 B0015




Asp
Receive.1
Report.1
CFP
Asp
Receive.1
(I3300)
Report.1
(E0422)
CFP
RBS
tar/envZ
TT
R1075 B0034 C0082 B0015 R0082
RBS
cfp
TT
B0034 E0022 B0015