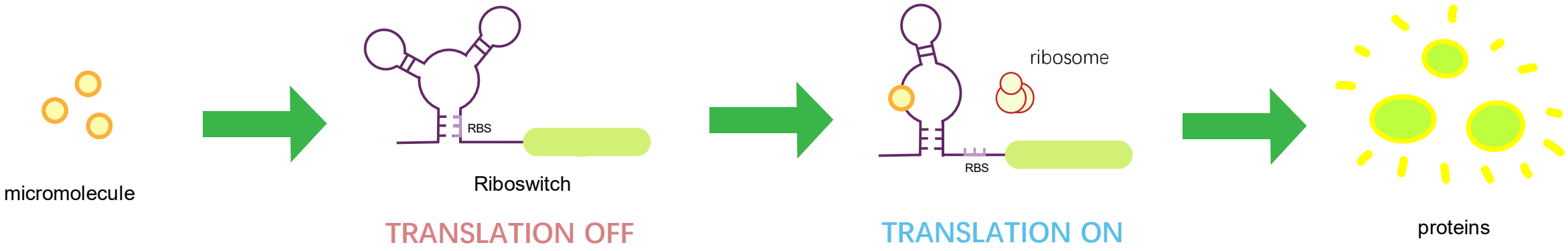
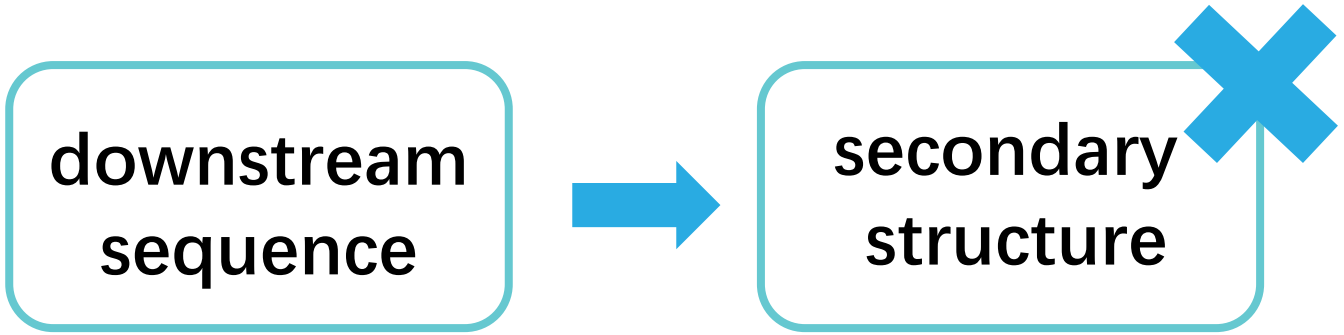
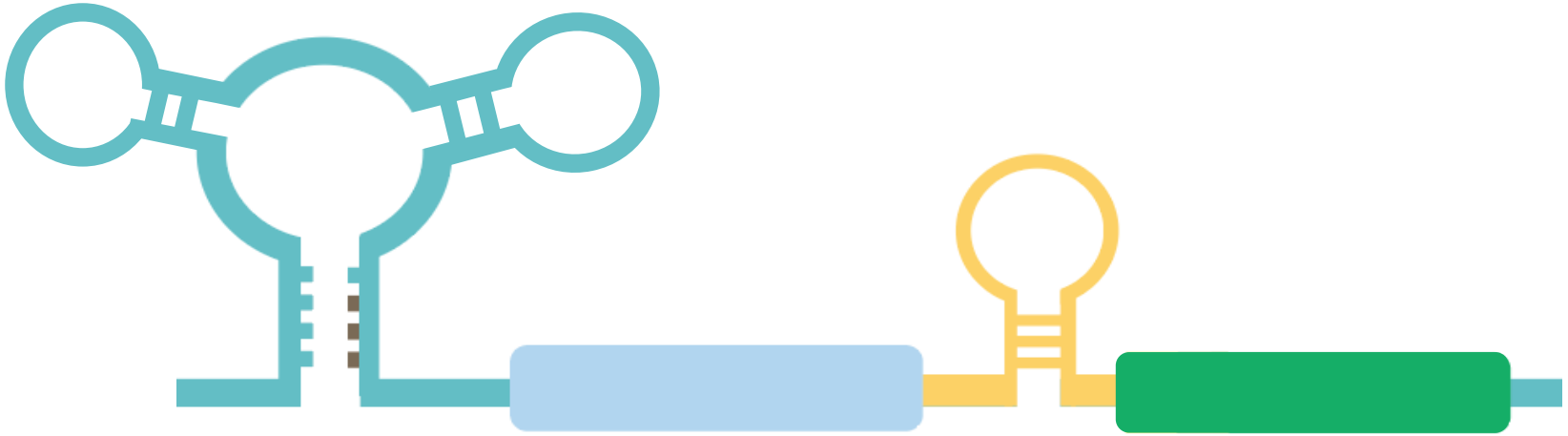
2019 OUC-China

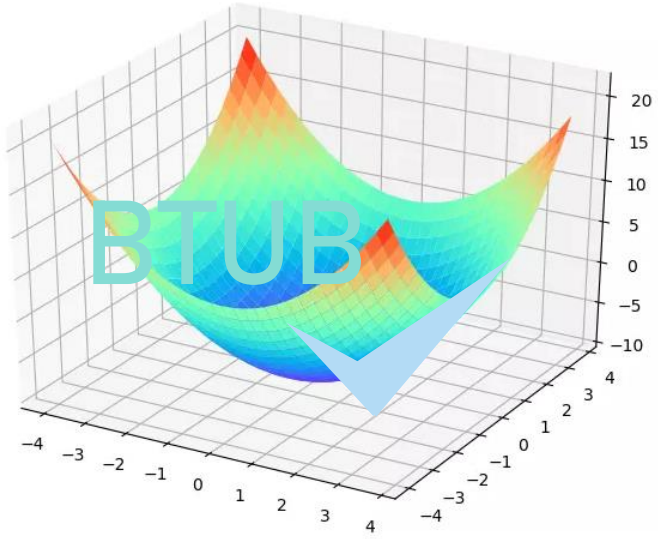




Modular riboswitch!


stabilizer
tuner

stabilizer tuner



Reference

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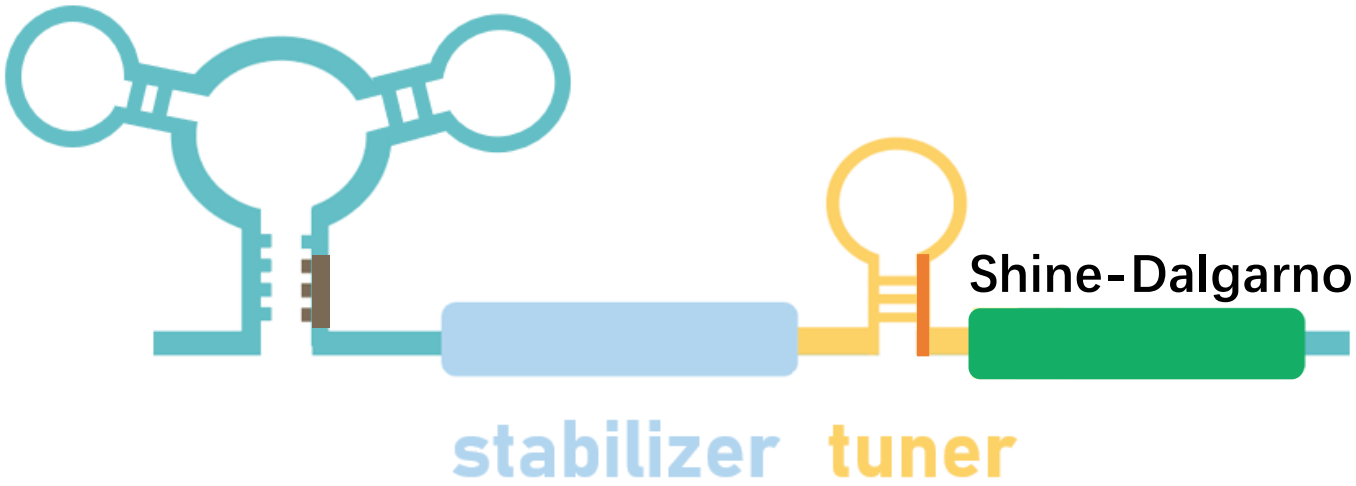
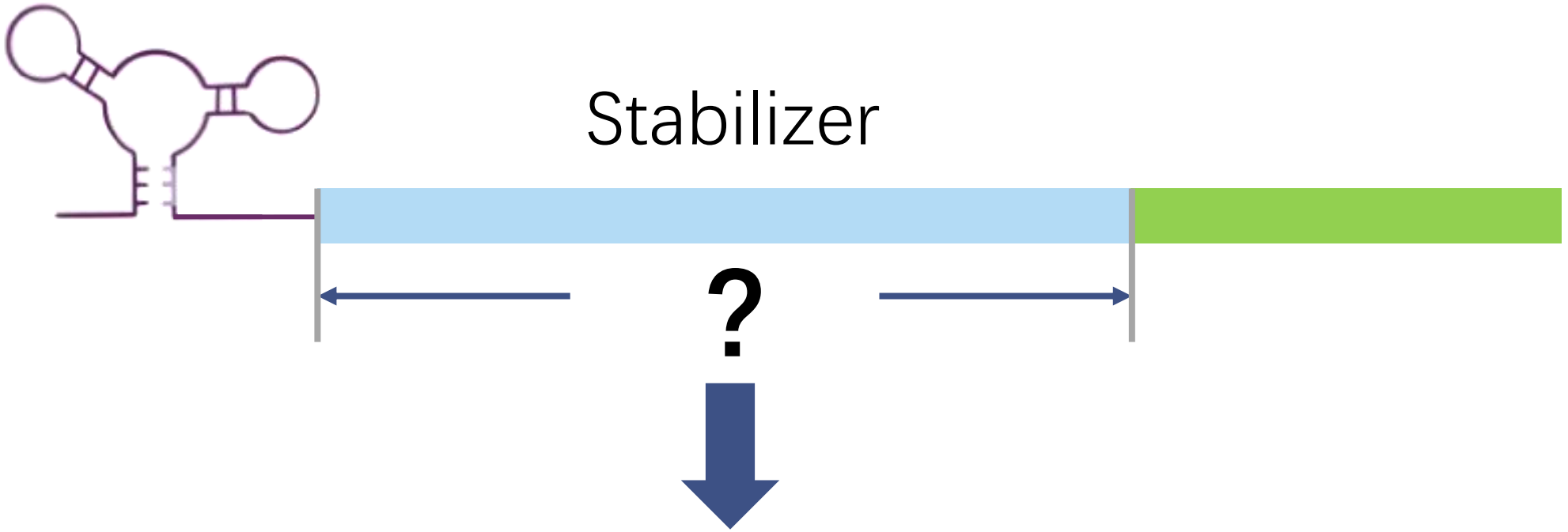
7. Allner O , Nilsson L , Villa A . Loop-loop interaction in an adenine-sensing riboswitch: A molecular dynamics study[J]. RNA, 2013, 19(7):916-926.

Thank you for watching

Q & A



Polycistron Structure



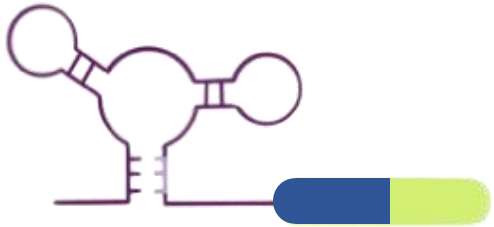
Stabilizer should be long enough to include the secondary structure of most riboswitches but short enough to minimise the overall size of the system.

Model validation

Q&A-1 Stablizer

1.Ribo

2.Ribo-STA



3.Ribo-GOI

Matrix： n*n

	A	G	G	C	T	.....
A	0	0	0	0	1	
G	0	0	0	1	0	
G	0	0	0	1	0	
C	0	1	1	0	0	
T	1	0	0	0	0	
.....						0

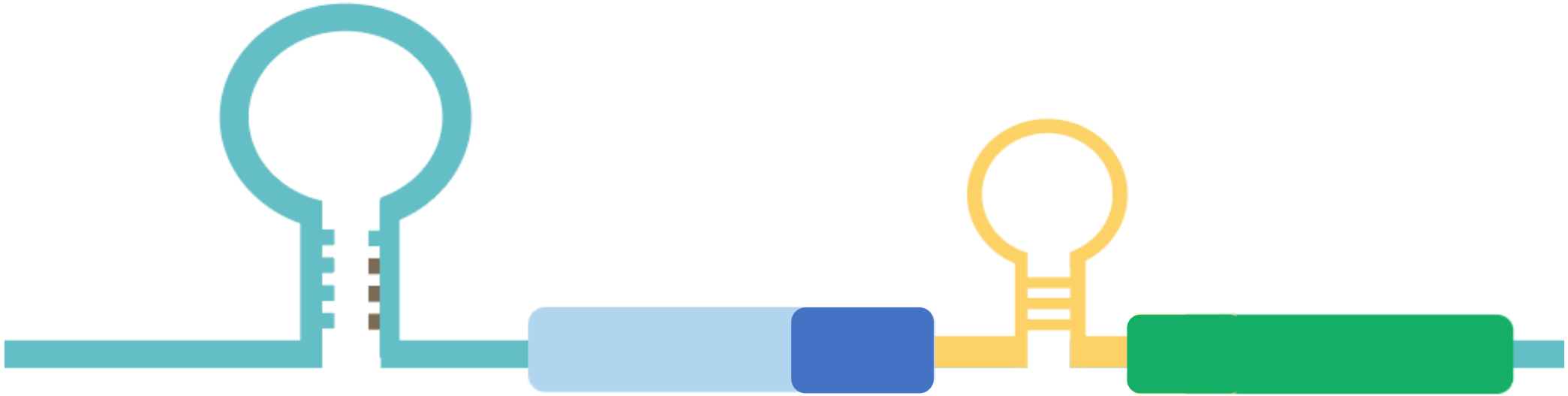
if $\left|\mathrm{Ribo}\_GOI - Ribo\right| = 0$

$$\mathrm{f} = \left|Ribo\_STA - Ribo\right| = 0$$

elif $\left|\mathrm{Ribo}\_GOI - Ribo\right| \neq 0$

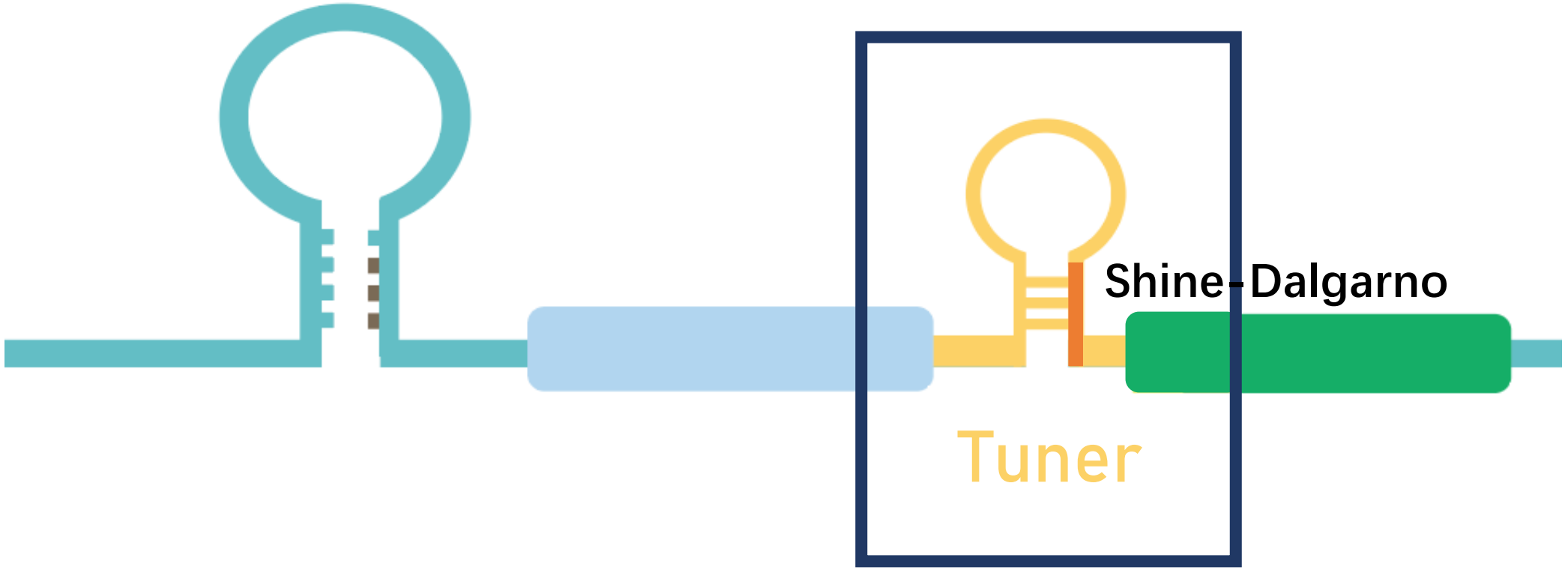
$$\min \left(\frac{\left|Ribo\_STA - Ribo\right|^2}{\left|Ribo\_GOI - Ribo\right|^2} \right)$$

Q&A-2 Tuner

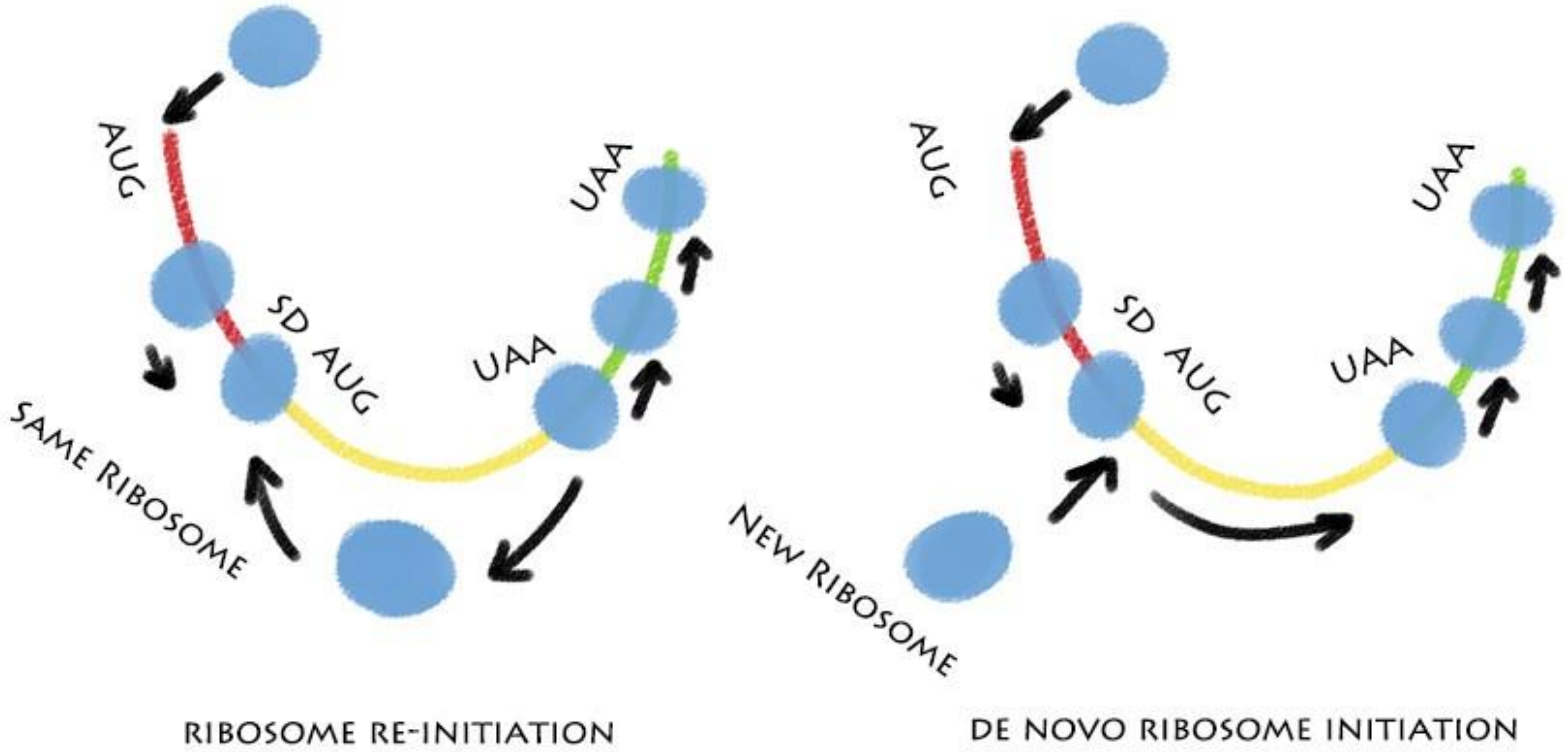


Degradation Tag Tuner

Q&A-2 Tuner



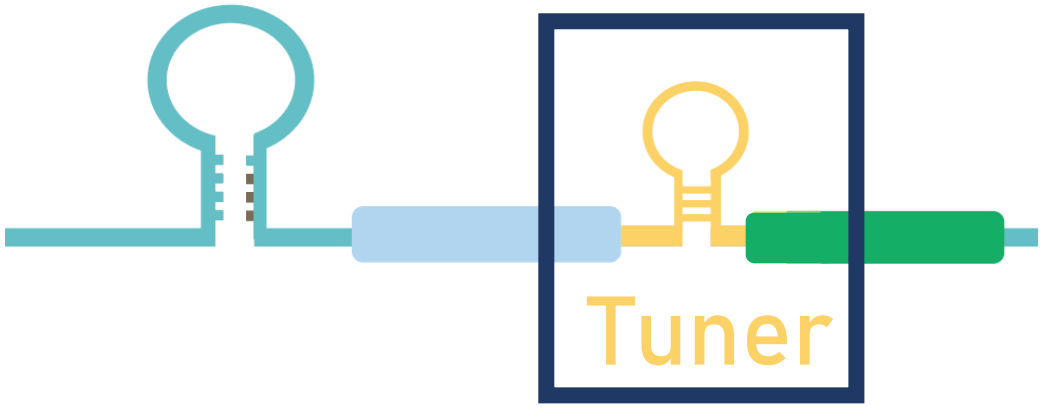
Q&A-2 Tuner



RIBOSOME RE-INITIATION

DE NOVO RIBOSOME INITIATION

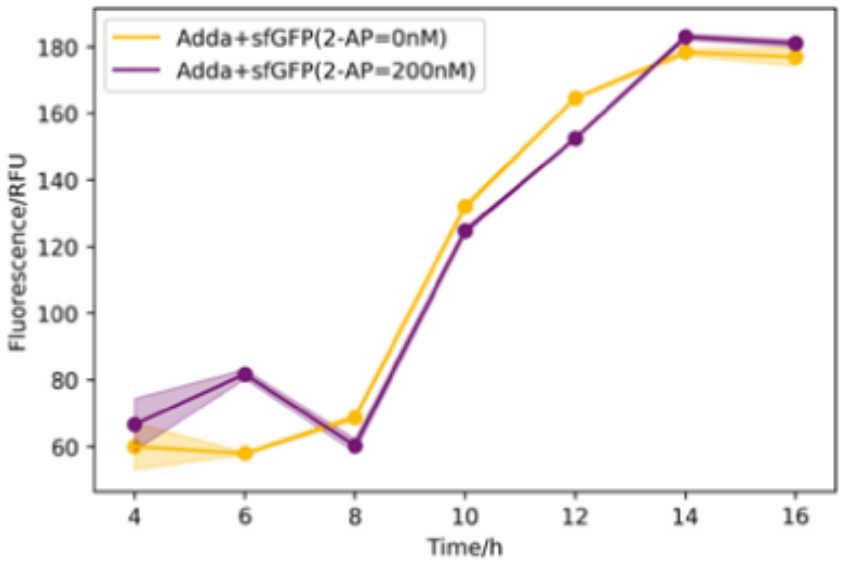
Q&A-2 Tuner

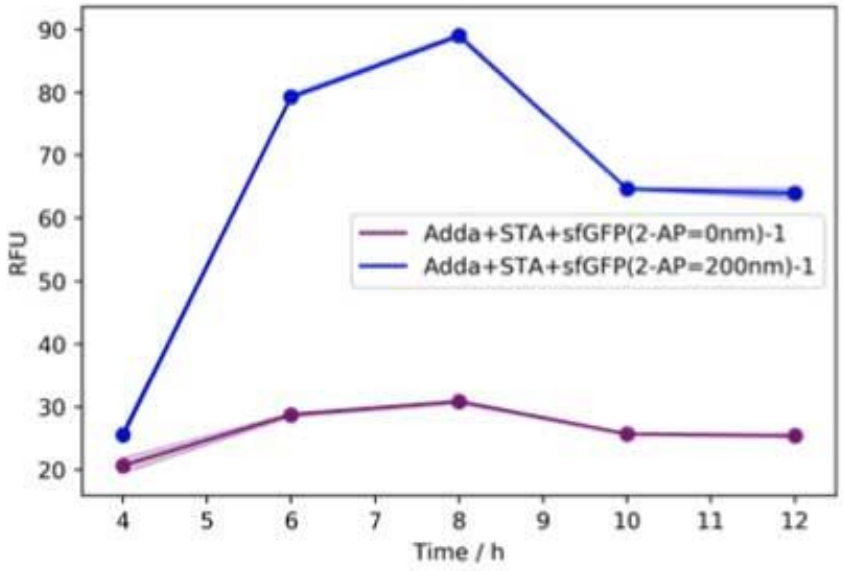


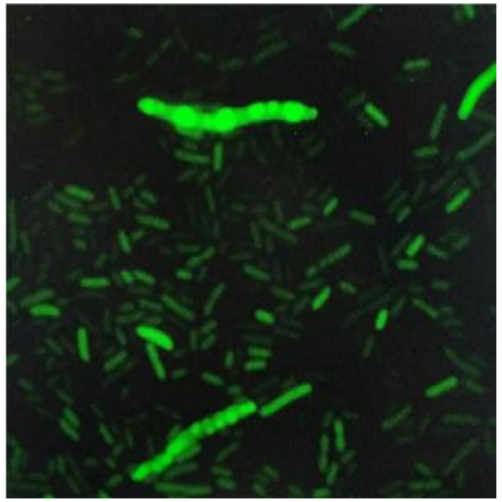
a. Origin polycistron Structure

b. Overlap Structure

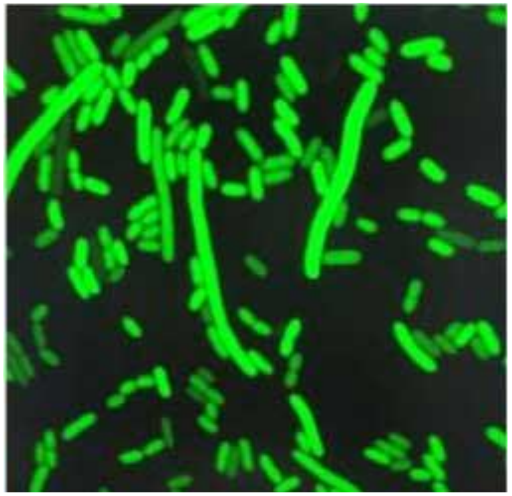
Q&A-3 Result


Adda+sfGFP(2-AP=0nM)
Adda+sfGFP(2-AP=200nM)
Fluorescence/RFU
Time/h

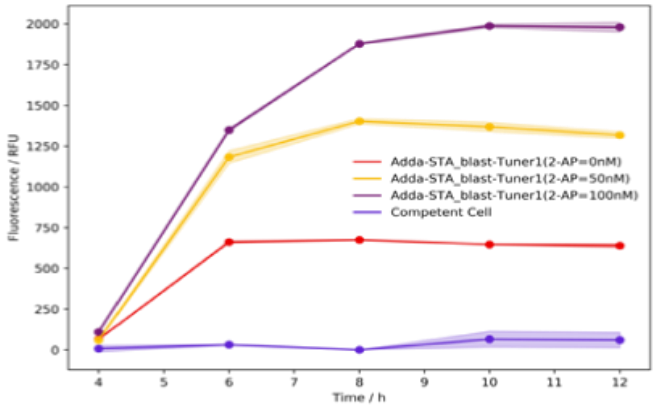

Adda+STA+sfGFP(2-AP=0nm)-1
Adda+STA+sfGFP(2-AP=200nm)-1
RFU
Time / h

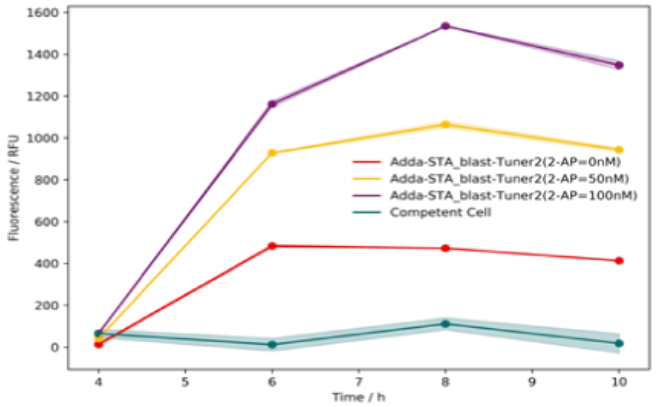


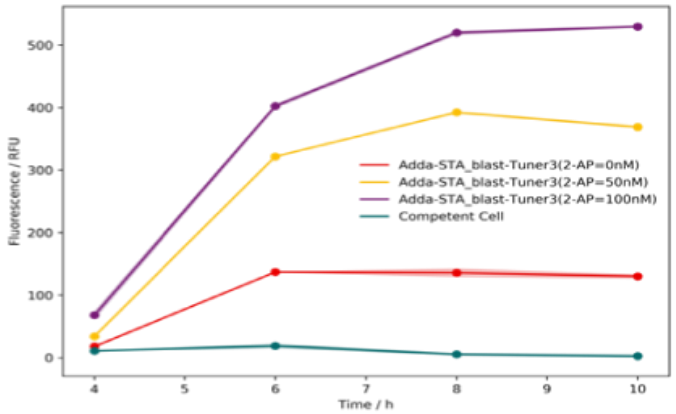
Q&A-3 Result

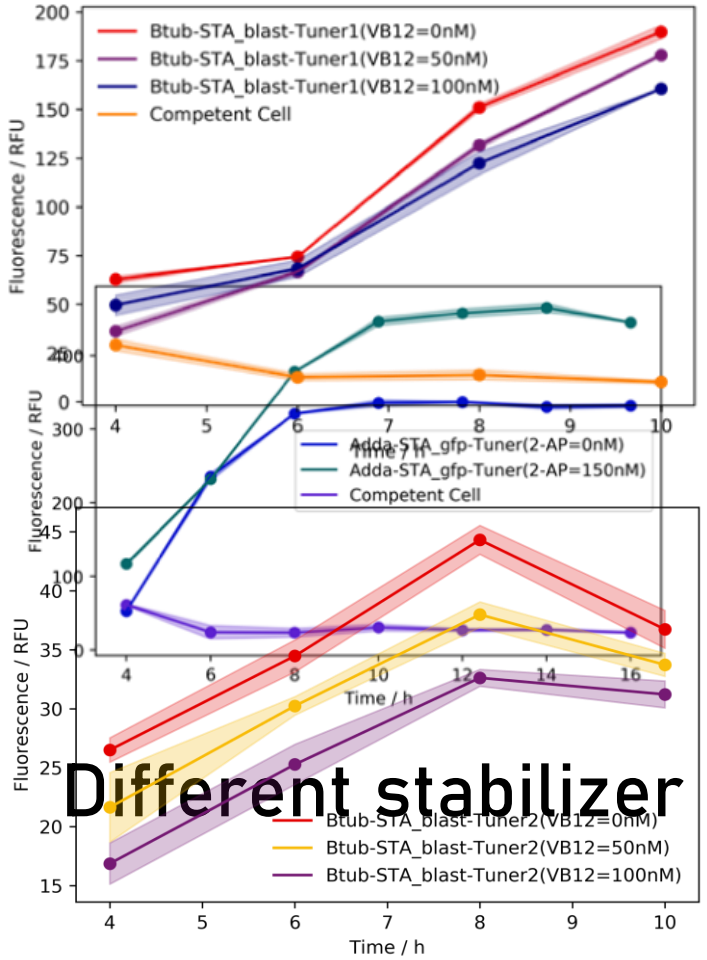


Tuner → Inclusion Body







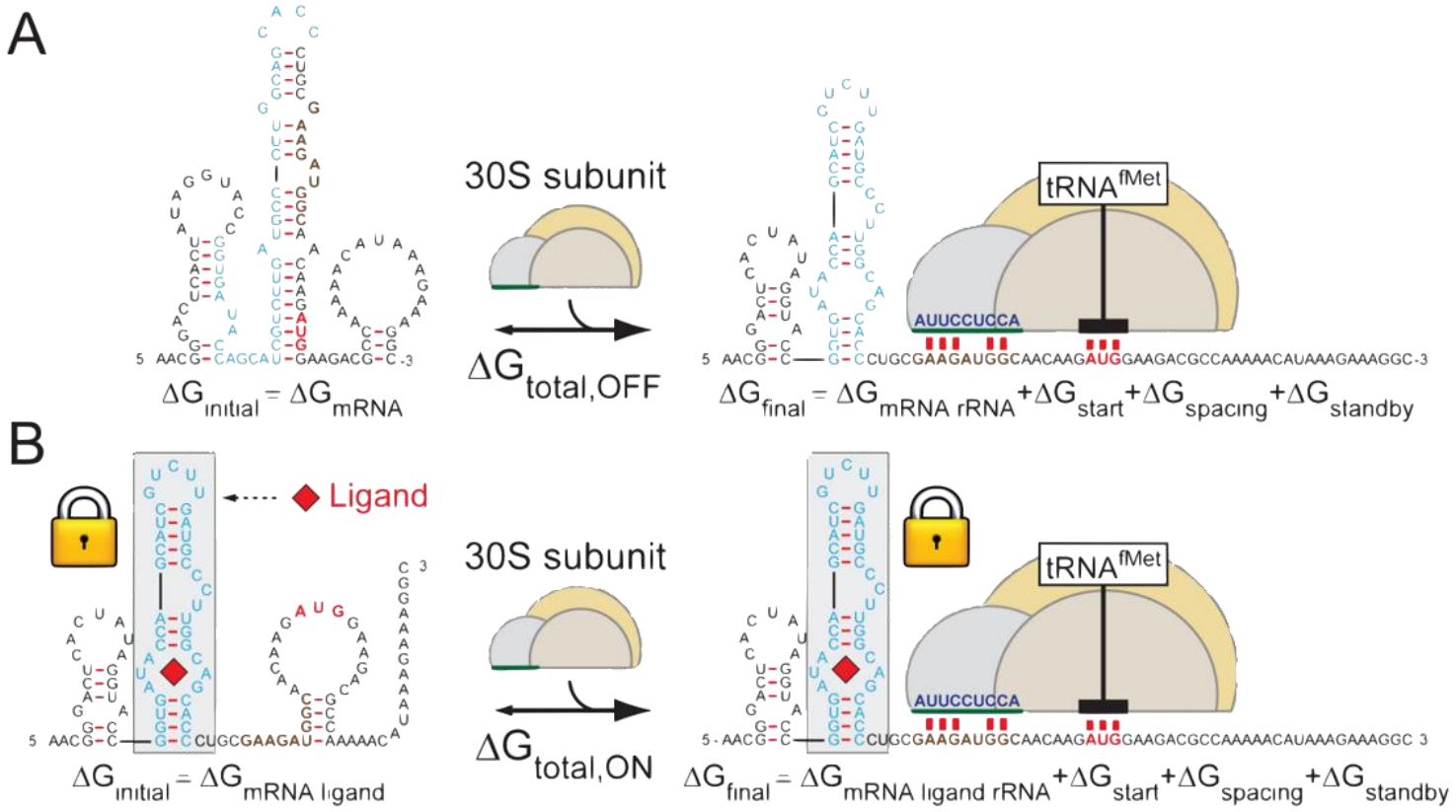


Different stabilizer

Different riboswitch

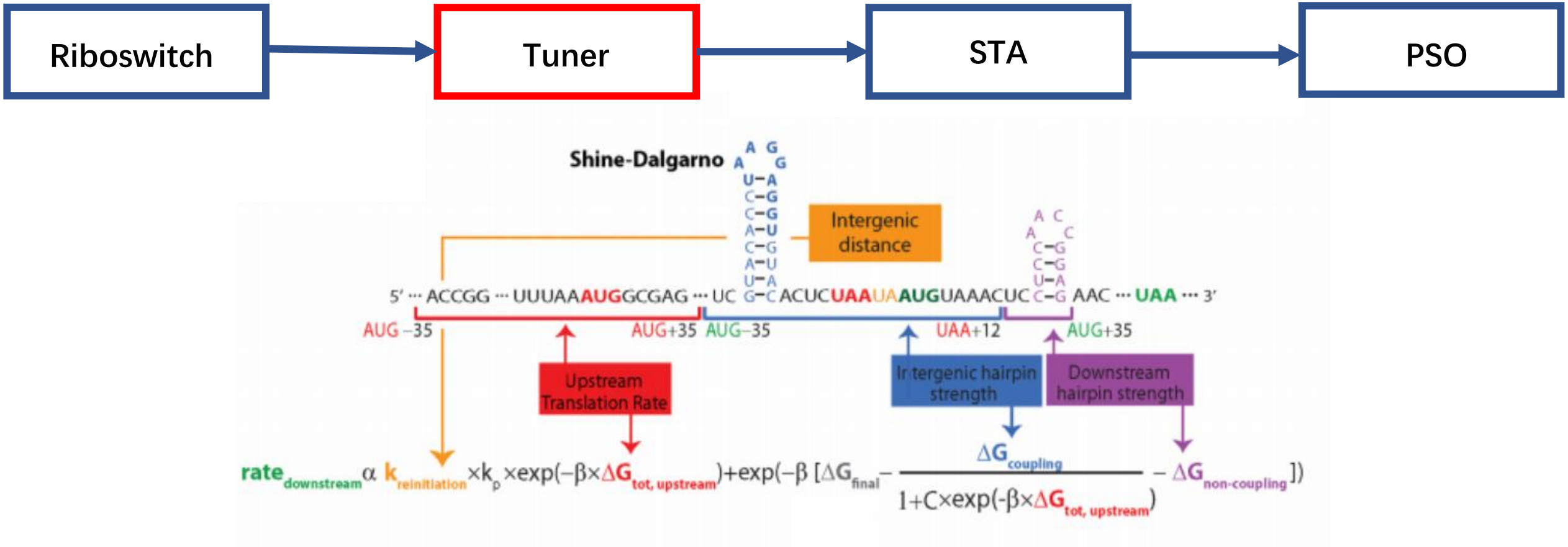
Q&A-4 Software

Riboswitch → Tuner → STA → PSO



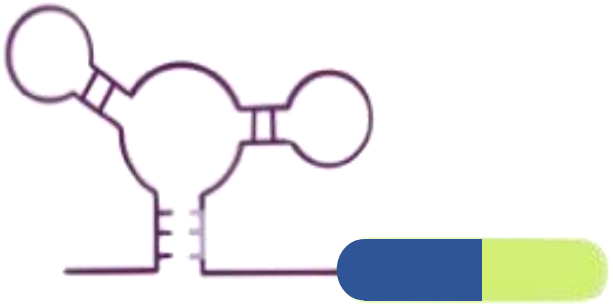
$$r_{ON} \propto \exp(-\beta \Delta G_{total,ON}) \qquad r_{OFF} \propto \exp(-\beta \Delta G_{total,OFF})$$

Q&A-4 Software



$$\min \left(\Delta G - \Delta G_{goal}\right)^2 + \lambda F(SD)$$

Q&A-4 Software



stabilizer

$$\min \left(\frac{\left| Ribo\_STA - Ribo \right|^2}{\left| Ribo\_GOI - Ribo \right|^2} \right)$$

Q&A-4 Software

Riboswitch → Tuner → STA → PSO