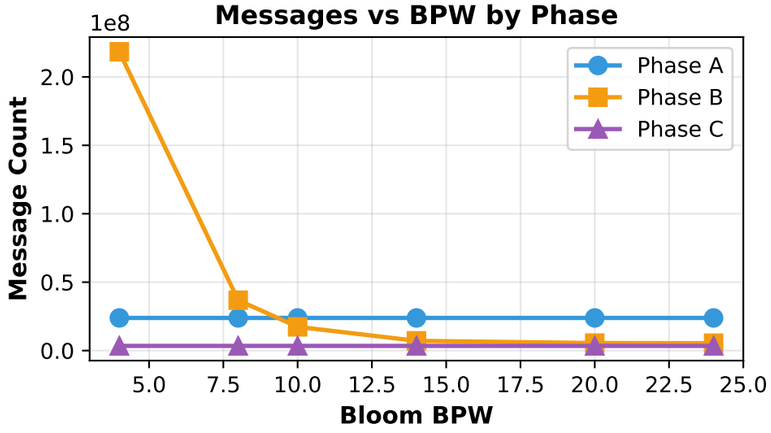
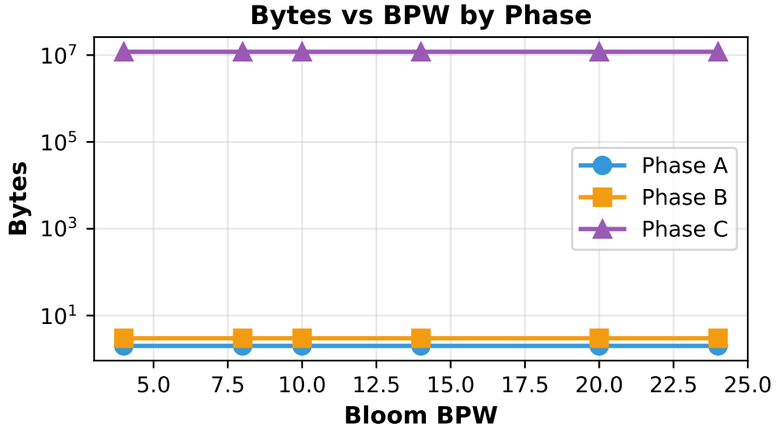
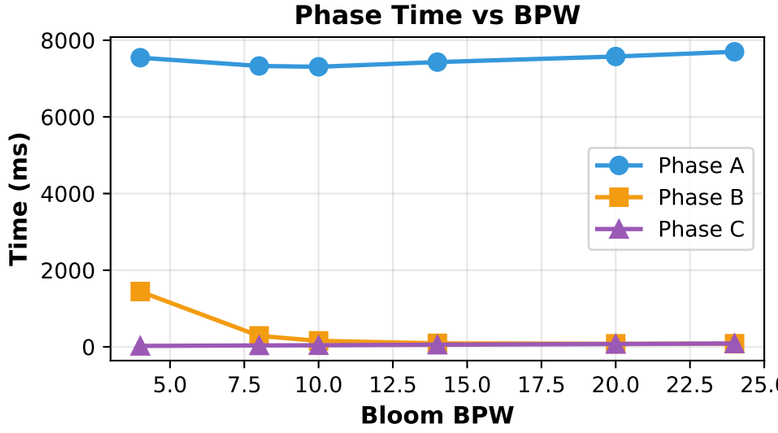
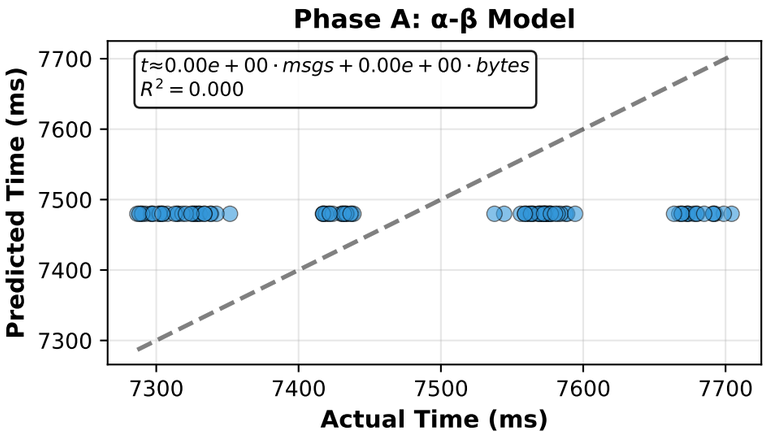
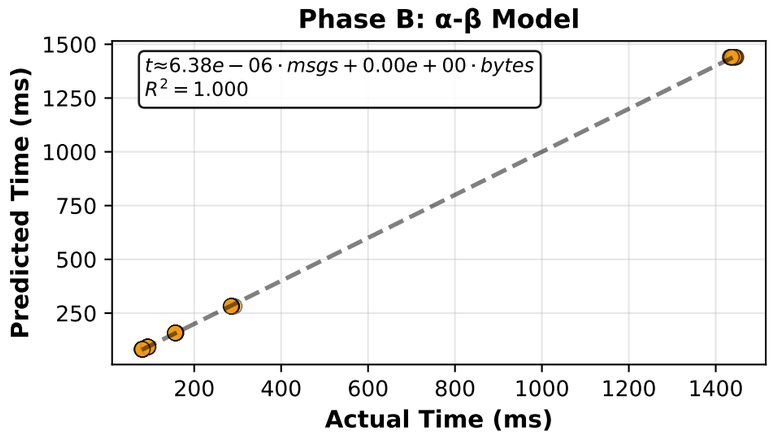
R=1: MPI Communication Cost Analysis (wall_time_ms)

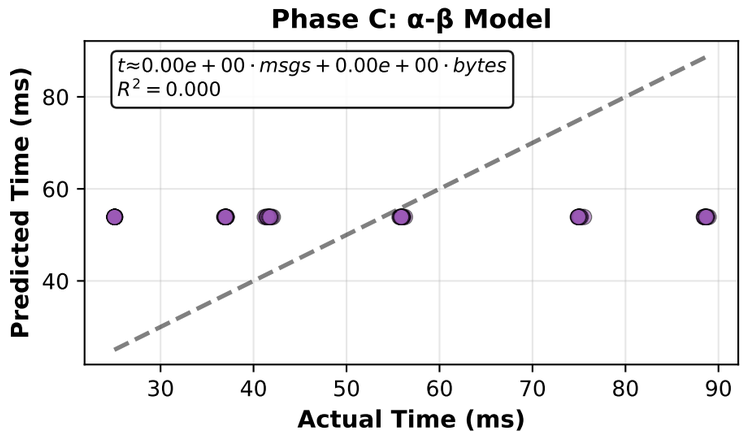


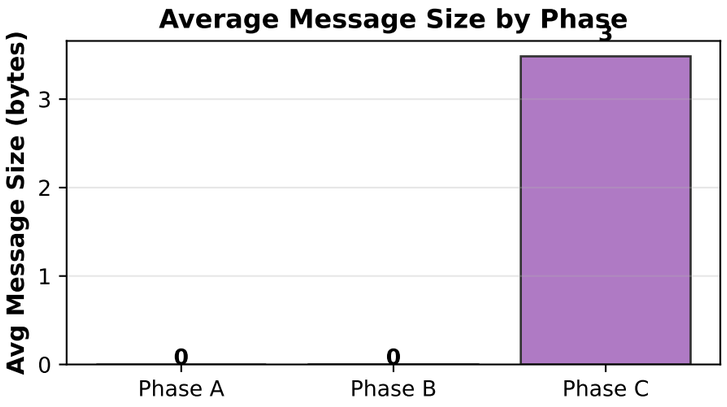


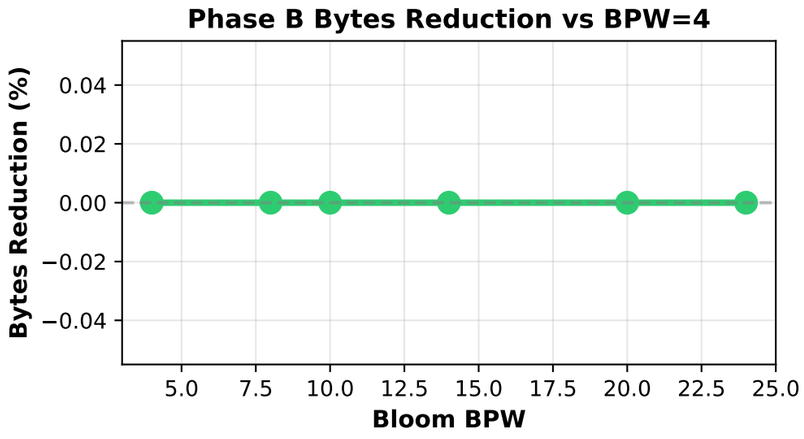


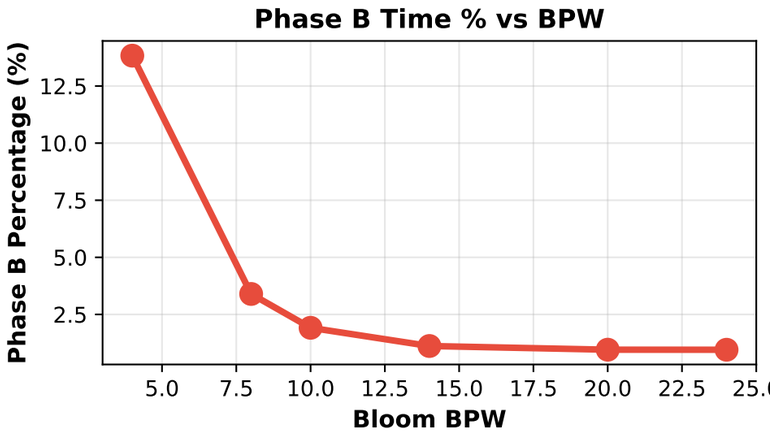








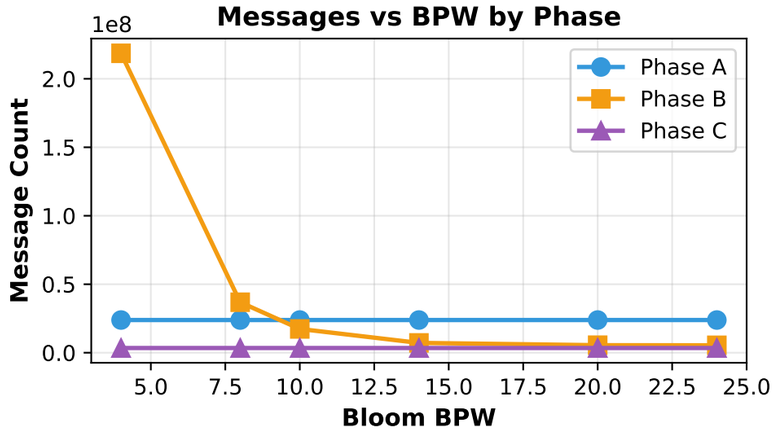


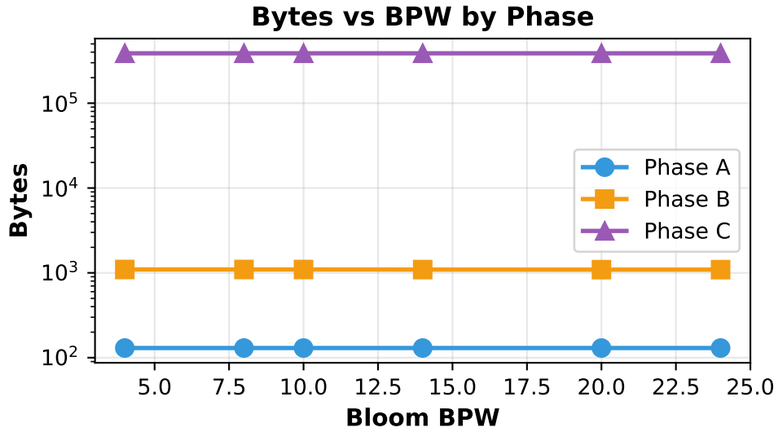


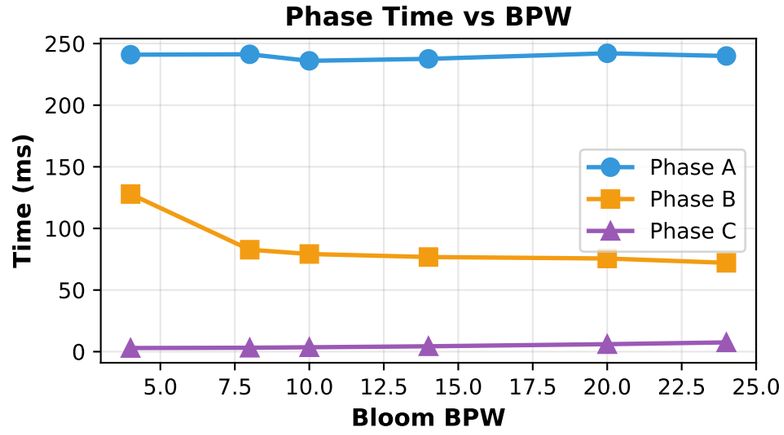
R=1: MPI Cost Model Summary - $t_{comm} \approx \alpha \cdot msgs + \beta \cdot bytes$

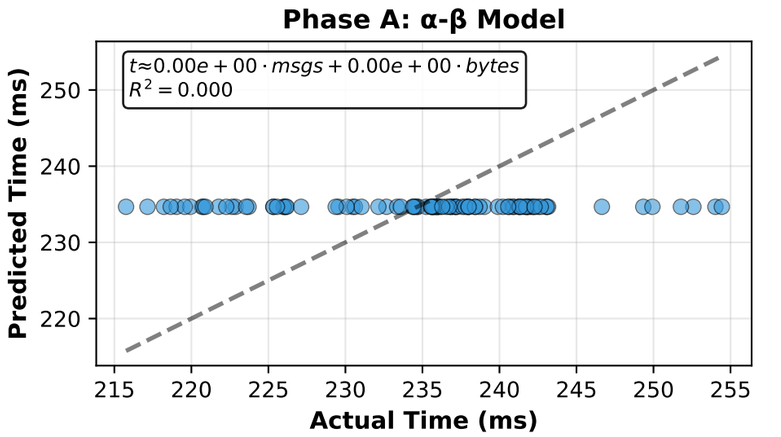
Phase	Msgs (median)	Bytes (median)	Time (ms)	α (ms/msg)	β (ms/byte)	R²
Phase A	23865598	2.00e+00	7488	0.00e+00	0.00e+00	0.000
Phase B	12242686	3.00e+00	125	6.38e-06	0.00e+00	1.000
Phase C	3425090	1.19e+07	49	0.00e+00	0.00e+00	0.000

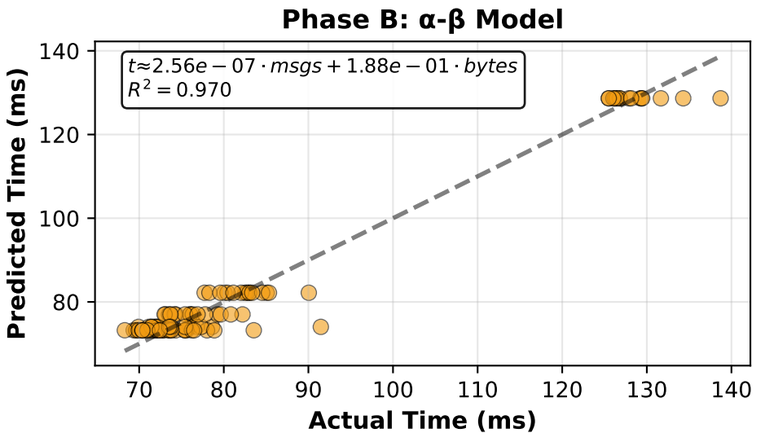
R=32: MPI Communication Cost Analysis (wall_time_ms)

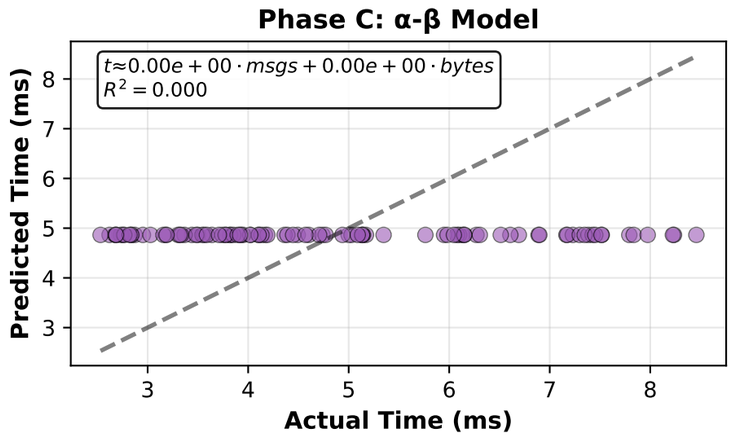


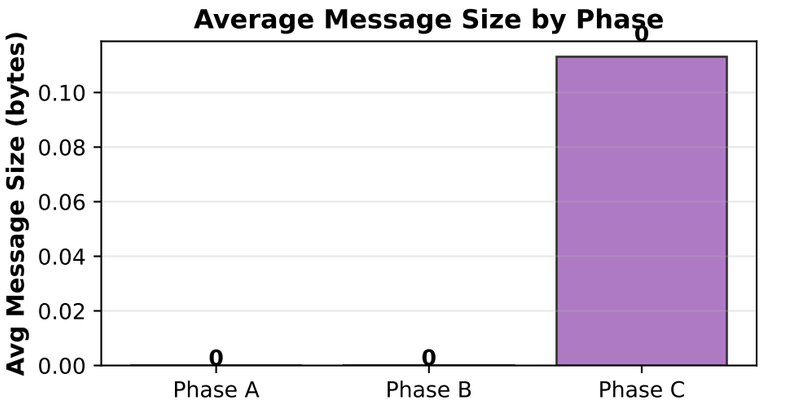


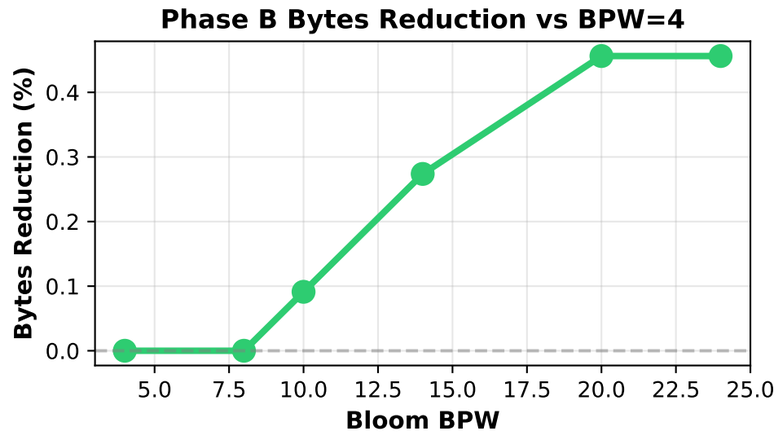


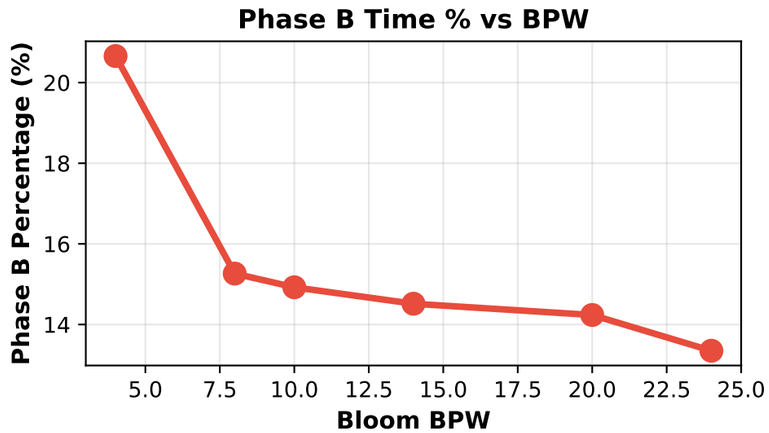








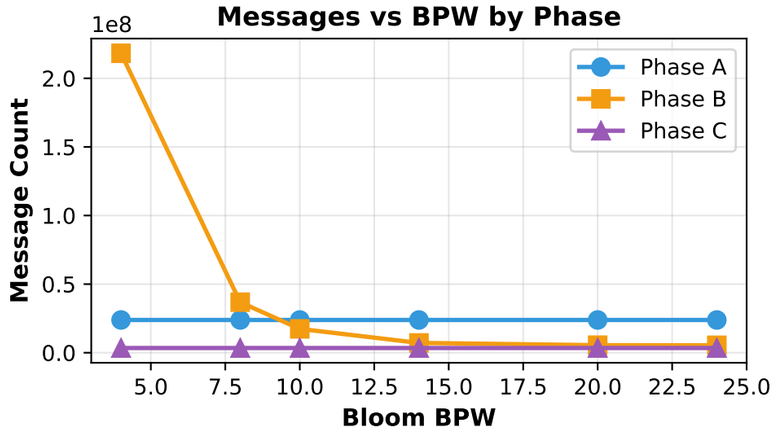


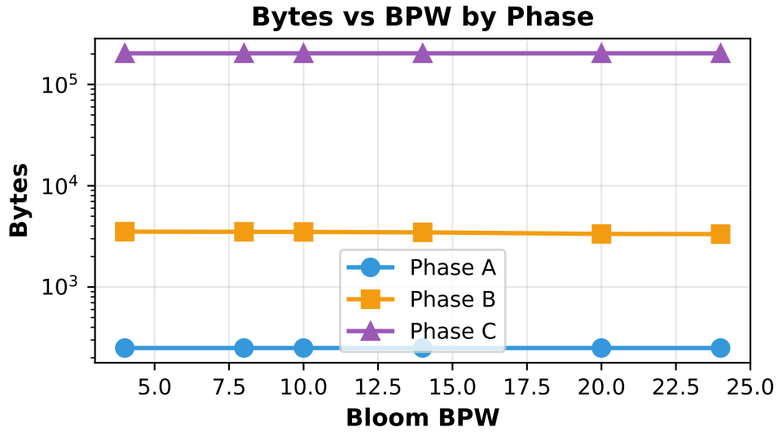


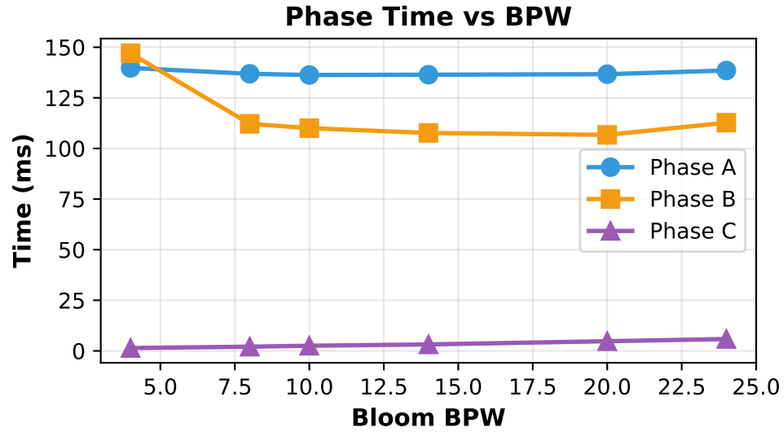
R=32: MPI Cost Model Summary - $t_{comm} \approx \alpha \cdot msgs + \beta \cdot bytes$

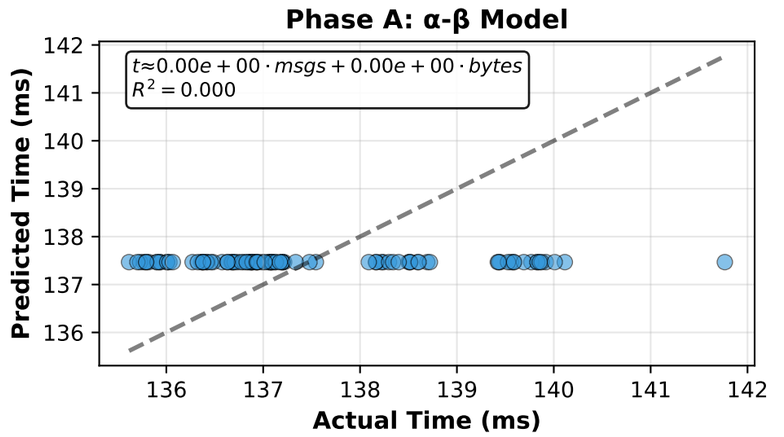
Phase	Msgs (median)	Bytes (median)	Time (ms)	α (ms/msg)	β (ms/byte)	R²
Phase A	23866862	1.30e+02	236	0.00e+00	0.00e+00	0.000
Phase B	12259689	1.09e+03	76	2.56e-07	1.88e-01	0.970
Phase C	3425090	3.87e+05	4	0.00e+00	0.00e+00	0.000

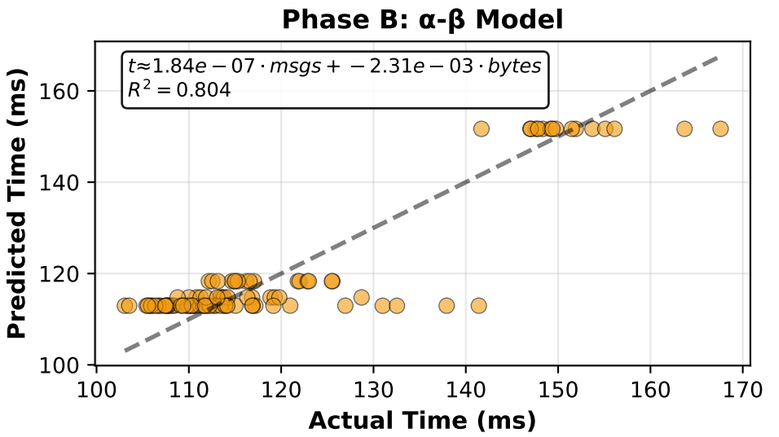
R=64: MPI Communication Cost Analysis (wall_time_ms)

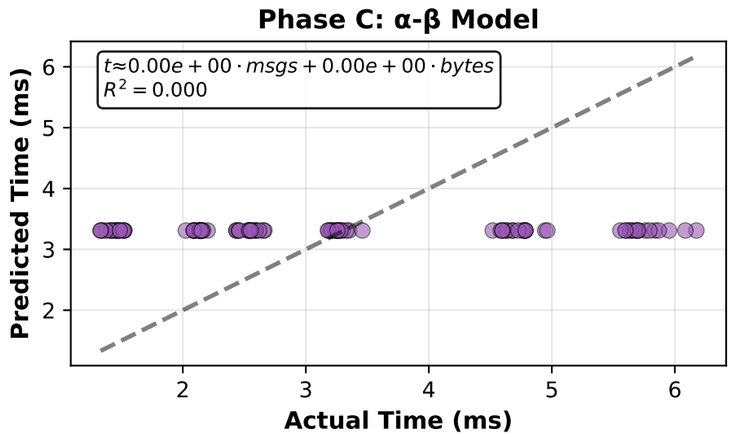


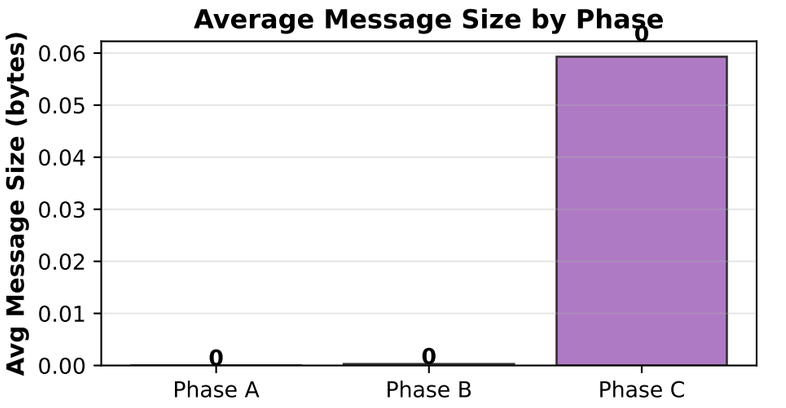


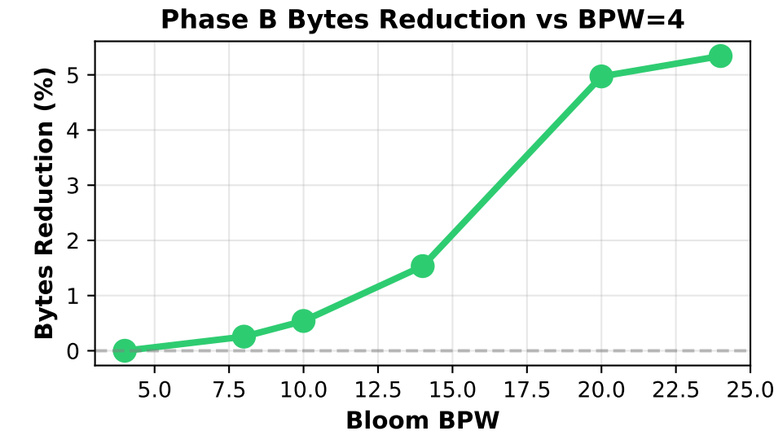


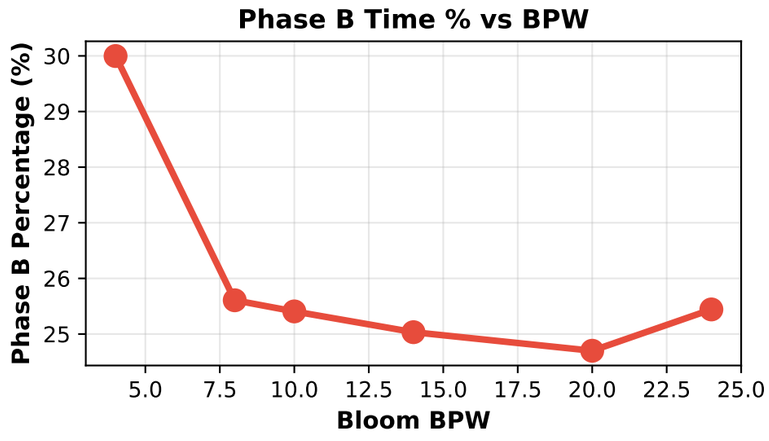












R=64: MPI Cost Model Summary - $t_{comm} \approx \alpha \cdot msgs + \beta \cdot bytes$

Phase	Msgs (median)	Bytes (median)	Time (ms)	α (ms/msg)	β (ms/byte)	R²
Phase A	23868110	2.50e+02	137	0.00e+00	0.00e+00	0.000
Phase B	12257883	3.48e+03	114	1.84e-07	-2.31e-03	0.804
Phase C	3425090	2.03e+05	3	0.00e+00	0.00e+00	0.000