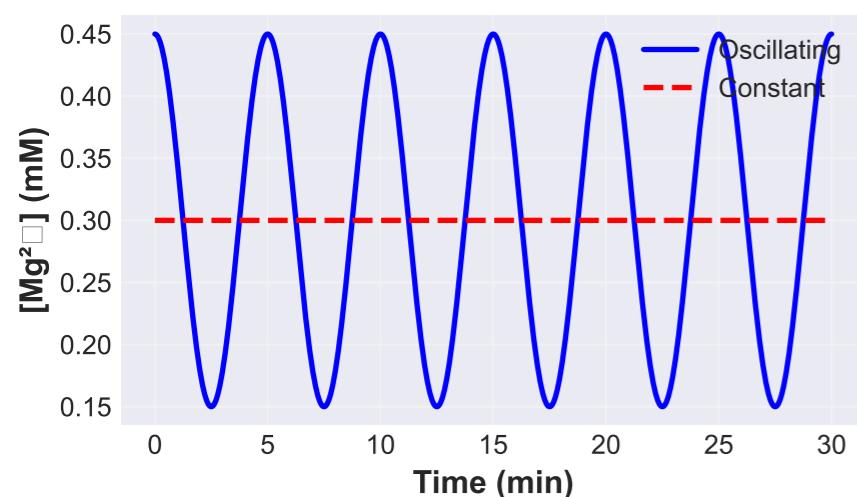
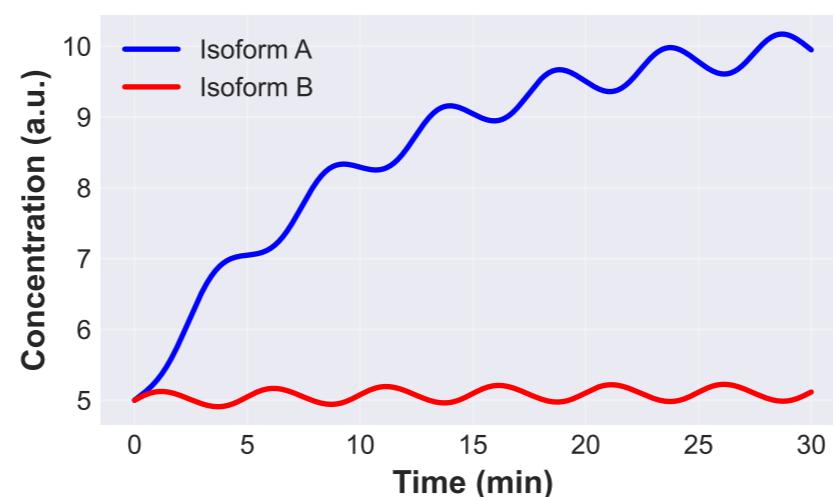


Alternative Splicing Dynamics: Charge-Dependent Isoform Selection

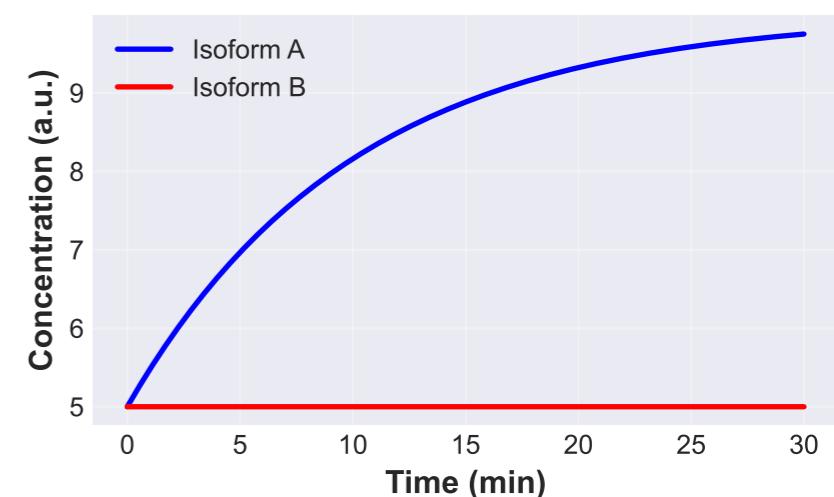
A. $[Mg^{2+}]$ Dynamics



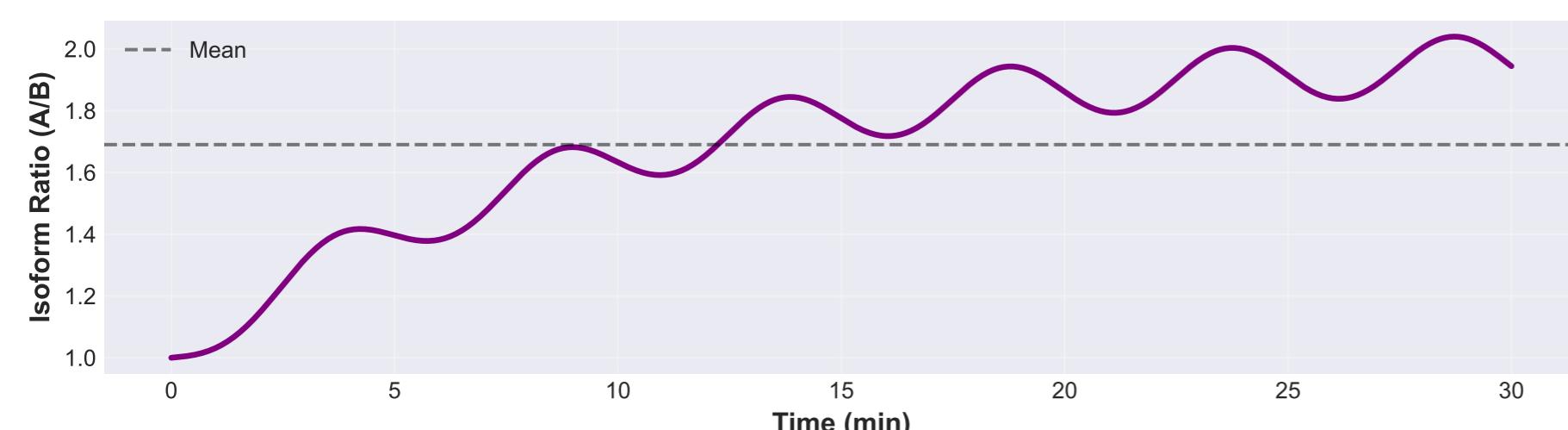
B. Isoform Dynamics (Oscillating $[Mg^{2+}]$)



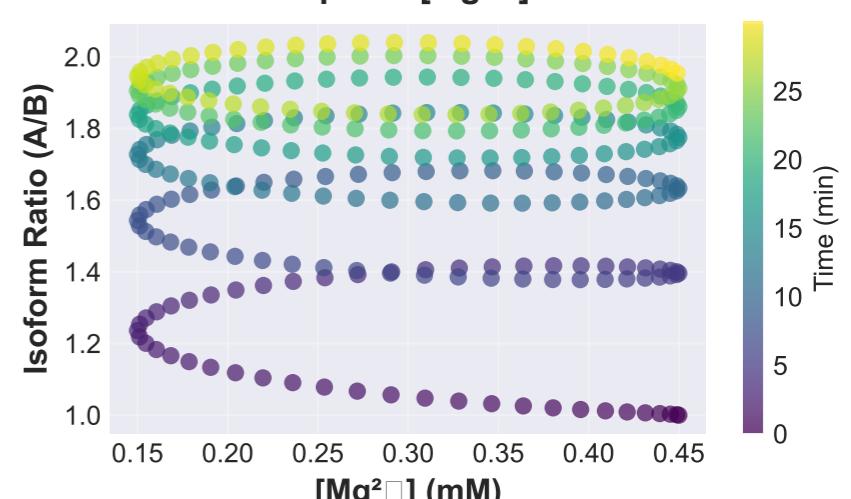
C. Isoform Dynamics (Constant $[Mg^{2+}]$)



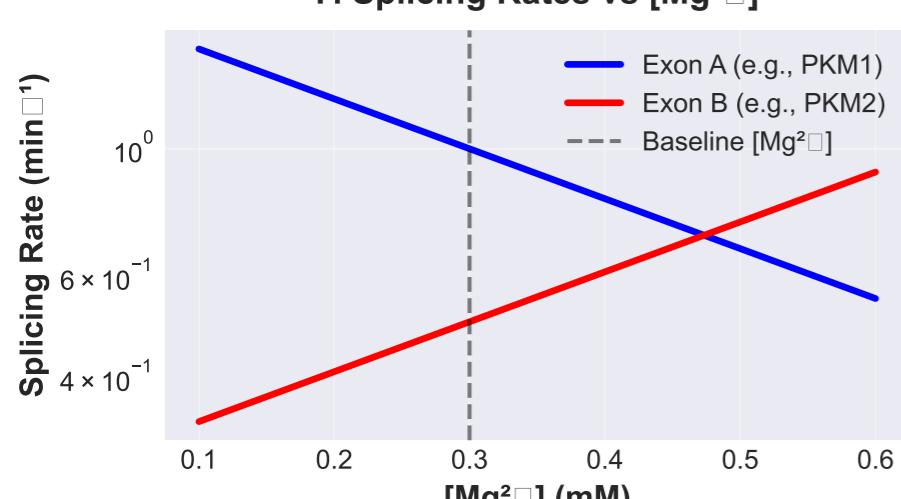
D. Isoform Ratio Oscillations



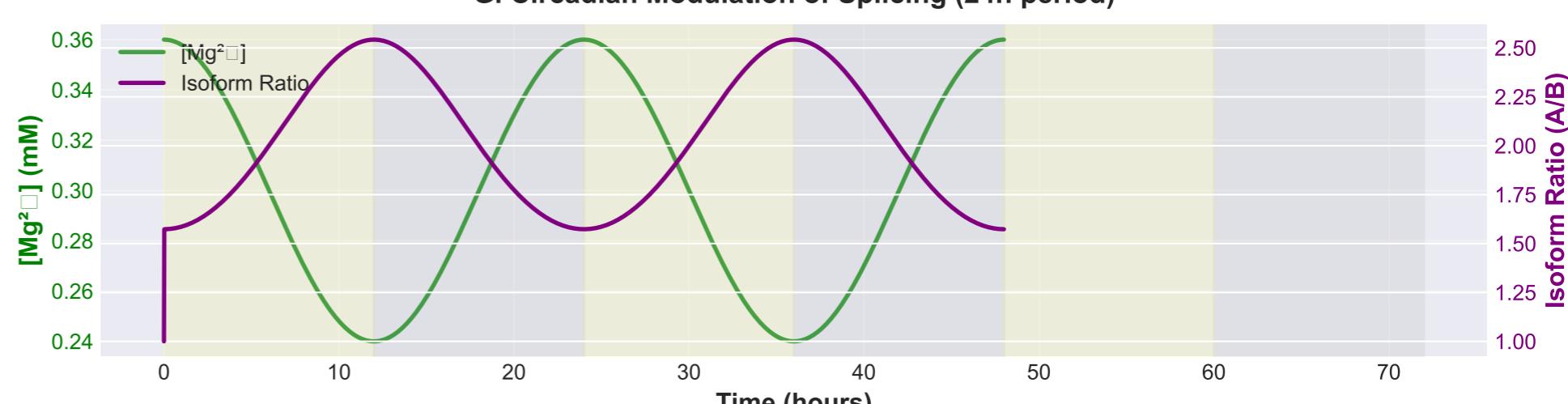
E. Phase Space: $[Mg^{2+}]$ vs Ratio



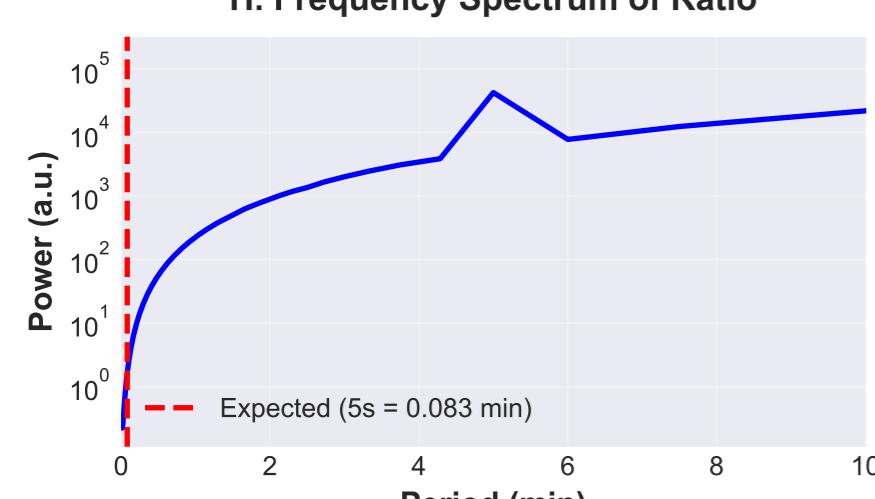
F. Splicing Rates vs $[Mg^{2+}]$



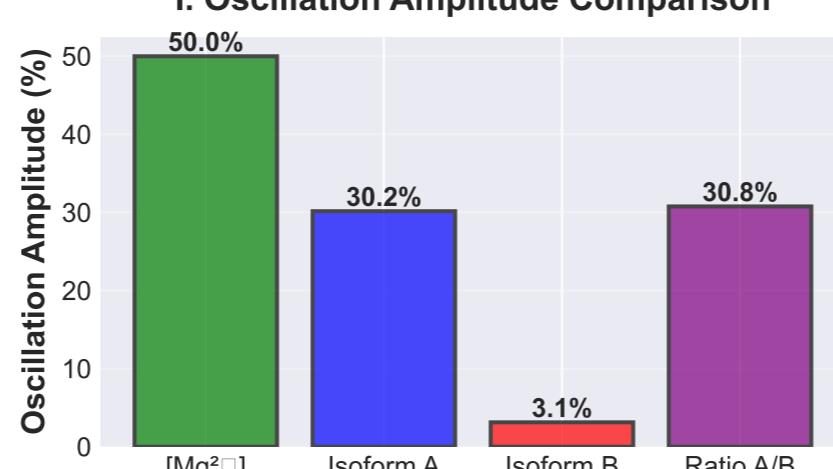
G. Circadian Modulation of Splicing (24h period)



H. Frequency Spectrum of Ratio



I. Oscillation Amplitude Comparison



SPLICING DYNAMICS STATISTICS

Oscillating $[Mg^{2+}]$ (5s period):

- Mean ratio: 1.69
- Std ratio: 0.27
- Amplitude: 30.8%
- IsoA amplitude: 30.2%
- IsoB amplitude: 3.1%

Constant $[Mg^{2+}]$:

- Mean ratio: 1.68
- Std ratio: 0.26
- Amplitude: 28.2%

Circadian (24h period):

- Mean ratio: 2.03
- Amplitude: 38.0%

Charge Mechanism:

- Low $[Mg^{2+}]$ \rightarrow long λ_D
- Long λ_D \rightarrow weak screening
- Weak screening \rightarrow Isoform A
- High $[Mg^{2+}]$ \rightarrow short λ_D
- Short λ_D \rightarrow strong screening
- Strong screening \rightarrow Isoform B

Predicted vs Observed:

- Oscillation period: 5s (ATP)
- Amplitude modulation: ~31%
- Circadian modulation: ~38%