Supporting Information for the Manuscript:

Augmenting Ion Trap Mass Spectrometers using a Frequency Modulated Drift Tube Ion Mobility Spectrometer

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Abstract: The crucial details regarding Fourier multiplexing a DT-IMS coupled to an LIT-MS system were outlined in the figures found in the body of the primary manuscript; however, we have included the following six figures for added clarity about the capabilities of the system. FT-IM-MS can be applied to the analysis of complex systems involving analytes with a variety of differing masses and charge states, all while yielding relatively consistent trends in resolving power and signal-to-noise ratios in relation to adjusting the swept frequency. Included here are a linear regression plot showing neurotensin 3+ peak intensity as a function of concentration (Figure S-1), the SNR versus frequency and resolving power versus frequency plots for both the charge states of lysozyme analyzed (13+ through 8+, Figures S-2 and S-3), as well as for the four fragments of cytochrome C examined (Figures S-4 and S-5). With regard to sweep rate stability of the waveform generators used, Figure S-6 shows a comparison of the two waveform generators used for this experiment; in this case, FT-IM-MS spectra were obtained for the neurotensin 3+ charge state. The sweep rate instability of waveform generator A compared to that of B can be seen in the form of echoes resulting in the drift time spectrum.

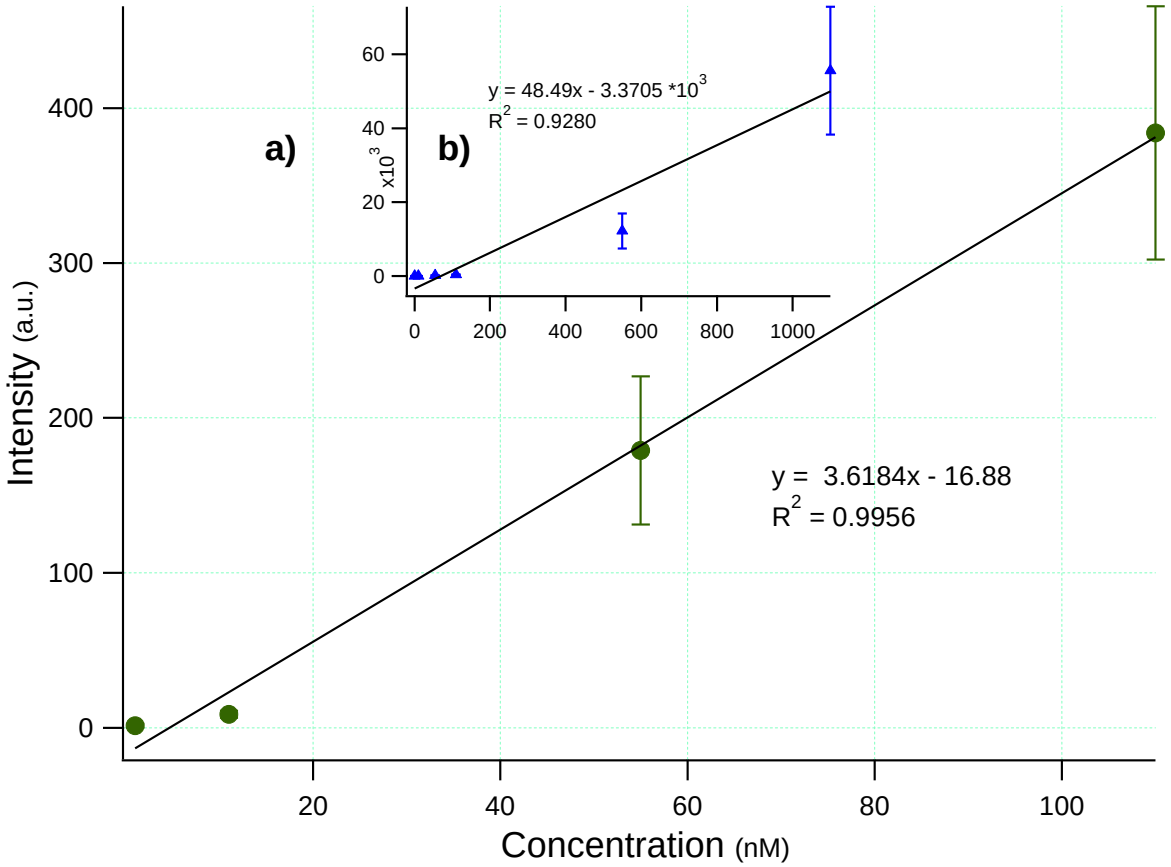

Figure S-1: a) Neurotensin 3+ drift time peak intensity shows linear behavior in response to concentration increases within the 1-110 nM range, although b) dynamic behavior with concentration change can be seen in the 1-1100 nM range for this system. Though non-linear at higher concentrations, the intensity profiles still increase which allows for quantiation.

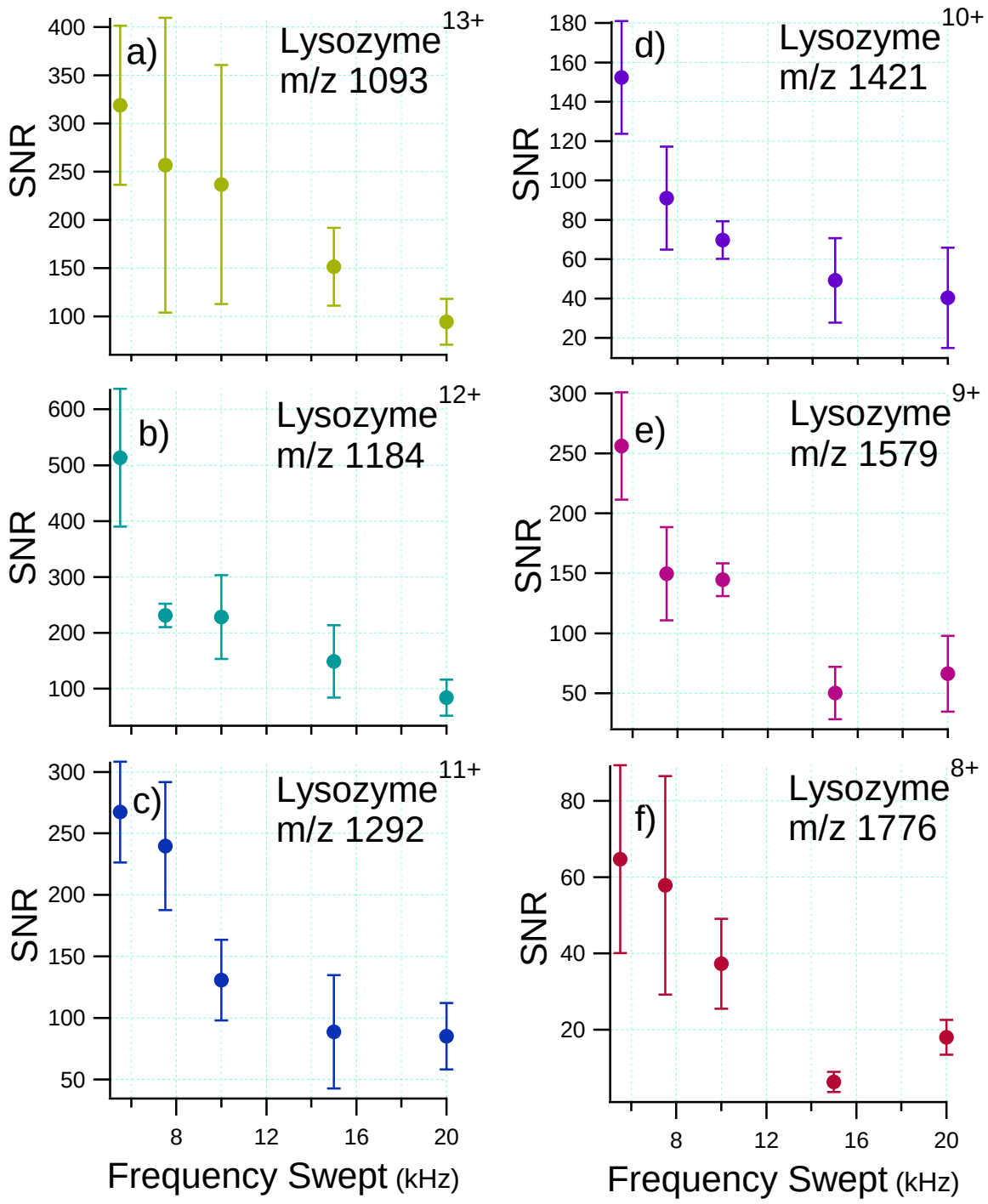

Figure S-2: Plots of SNR as a function of sweep frequency for lysozyme charge states 13+ through 8+ (a-f, respectively).

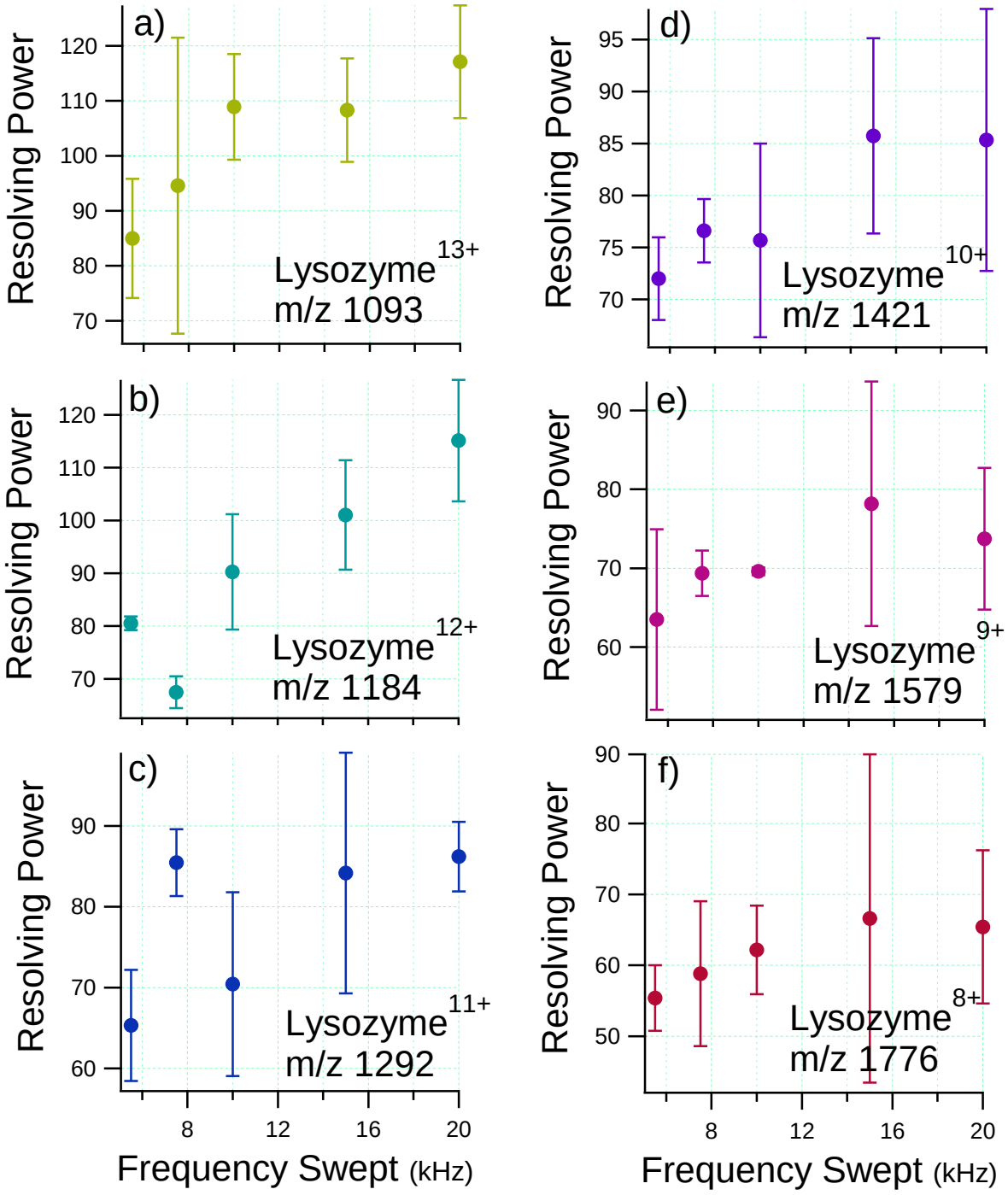

Figure S-3: Plots of resolving power as a function of sweep frequency for lysozyme charge states 13+ through 8+ (a-f, respectively).

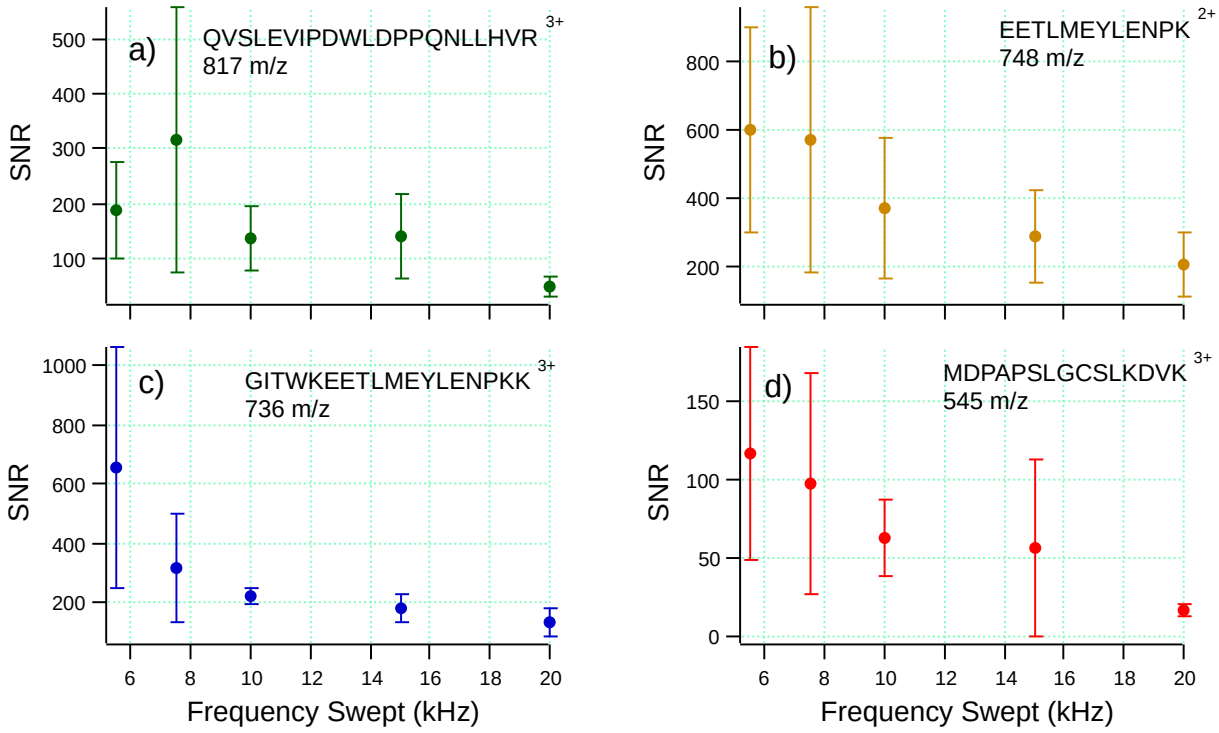

Figure S-4: Plots of SNR as a function of sweep frequency for cytochrome C fragments of *m/z* (a) 817, (b) 748, (c) 736, and (d) 545.

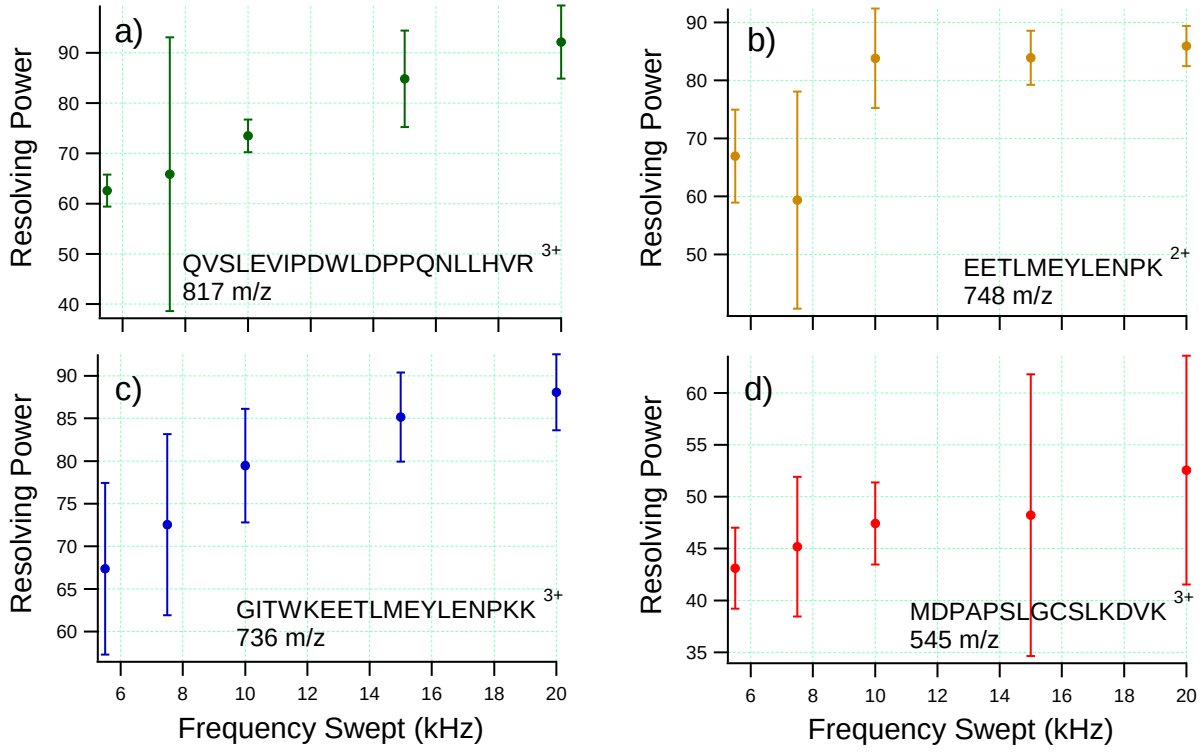

Figure S-5: Plots of resolving power as a function of sweep frequency for cytochrome C fragments of *m/z* (a) 817, (b) 748, (c) 736, and (d) 545. Lower resolving powers were noted for the peptide outlined in (d) but this observation should be tempered with the knowledge that this peak also demonstrated a lower SNR and its size combined with the multiple charging can give rise to unresolved protomers.

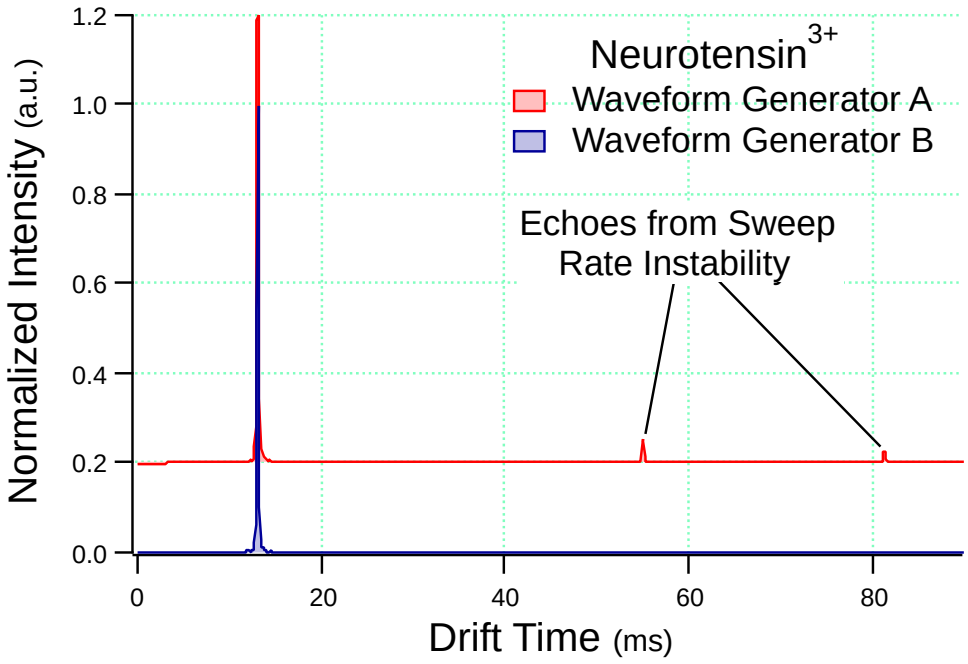

Figure S-6: A comparison of the two waveform generators used with respect to sweep rate stability; waveform generator A suffers from greater instability than waveform generator B, as indicated by the presence of echoes in waveform generator A's FT drift time spectrum for 3+ charge state of neurotensin.