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**Towards imaging the folding of single biomolecules in an ion trap**[1] ERIK STREED[2], Griffith University — Recent advances in imaging of single trapped atomic ions have demonstrated wavelength-scale fluorescence and absorption imaging (Streed et al. Nat. Comm 3 933 (2012)). We propose adapting these imaging techniques to investigate the folding properties of biological molecules in the gas phase. Trapped-ion mass spectrometry is a well-established technique for compositional analysis of biomolecules from small proteins to whole virus particles. Confining single isolated biomolecules in an ion trap provides a uniquely adaptable environment in which to investigate higher-order folding dynamics through manipulation of the surrounding solvent cage, temperature, and net charge at the single quantum level. We propose to optically observe these changes in folding through statistical super-resolution microscopy of different fluorescent groups. To this end we show that wavelength-scale confinement of singly-charged high-mass biomolecular ions is feasible with established trap designs using room temperature buffer gas cooling. In this regime the translational thermal motion of the ion does not contribute substantially to optical spot width.

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