

Technological developments in mass spectrometry towards molecular structural elucidation of macromolecular assemblies

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Propositions accompanying the dissertation

Technological Developments in Mass Spectrometry Towards Molecular Structural Elucidation of Macromolecular Assemblies

1. The photofragment ion imaging implemented on the Orbitrap/time-of-flight imaging instrument effectively yields valuable insights into the behavior and energetics of macromolecular assemblies in the gas phase. - This thesis
2. The capability of the Timepix detector family to distinguish and image individual ion events enables many different innovative applications. - This thesis
3. The time-resolved imaging capability of the Timepix detector makes it a suitable tool for gaining an in-depth understanding of the ion trajectories and the unusual ion optical processes occurring within the mass spectrometer. - This thesis
4. The evaluation of mass-to-charge-resolved fragment images on an individual macromolecular assembly ion level by the integration of different fragmentation techniques to the Orbitrap/time-of-flight imaging instrument holds the promise of unveiling fundamental insights into each dissociation process. - This thesis
5. The orthogonal time-of-flight LCT mass spectrometer's ability to perform measurements across a wide mass range spanning several Da to a few MDa, using the same ion optical settings, just by adjusting the pressure in the ion guides is remarkable. - This thesis
6. The utilization of the photofragment single ion imaging mass spectrometry for the reconstruction of the 3D geometry of macromolecular assemblies remains challenging. - This thesis
7. The signal quality of high-mass ions measured using microchannel plates can be enhanced by incorporating a Timepix readout chip and accelerating the ion beam prior to reaching the detection assembly. - This thesis
8. Multiple analytical tools are necessary for the molecular structural elucidation of multiproteoform complexes at different levels of their organization.
9. We have to remember that what we observe is not nature itself, but nature exposed to our method of questioning. - Werner Heisenberg
10. The pessimist complains about the wind; the optimist expects it to change; the realist adjusts the sails. – William Arthur Ward

Anjusha Mathew