

L15

Three-dimensional Electron Microscopy: Current challenges

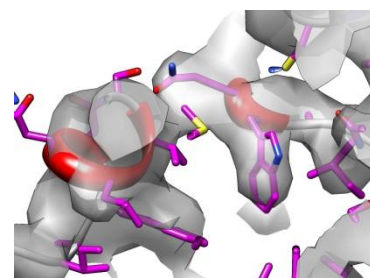
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Three-dimensional electron microscopy (3DEM) aims at providing precise estimations of the three-dimensional structure of biological specimens from sets of electron microscopy images. Depending on the size of the biological specimen and of the technological approach to be followed, and substantially simplifying the field, we may differentiate between “Tomography” (when studying relatively large and structurally unique specimens) and “Single Particle Analysis”



or SPA, when studying biological macromolecules. In the attached Figure we present a close-up of a very good EM structure fitted with atomic resolution data. In this presentation we will review the current state of the art for SPA, briefly introducing Tomography in the context of a new and emerging type of microscopy, as it is Soft X-rays Tomography. In this way we will review the physics and mathematics behind these types of structural analysis, presenting a number of examples. It will become apparent that the study of flexible macromolecules is especially suited to these techniques, and we will comment on the current challenges in the field. Finally, we will introduce some of the infrastructure-oriented projects that we are addressing as part of our commitment to the Instruct project on Strategic European Infrastructures for Structural Biology.

Referemces: C.O.S. Sorzano, J. M. de la Rosa Trevín, J. Otón, J. J. Vega, J. Cuenca, A. Zaldívar-Peraza, J. Gómez-Blanco, J. Vargas, A. Quintana, R. Marabini, J. M. Carazo. *Semiautomatic, high-throughput, high-resolution protocol for three-dimensional reconstruction of Single Particles in Electron Microscopy*. *Nanoimaging: Methods and Protocols*. Eds. Alioscka Sousa, Michael Kruhlak. Humana Press (in press)