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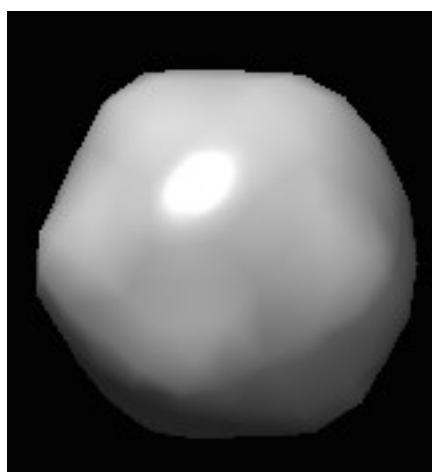
APPLIED CRYSTALLOGRAPHY

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Structure of viruses from experimental data from an X-ray free electron laser

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The X-ray Free Electron Later (XFEL) is a brand new machine capable of delivering X-ray to a sample some 10 billion times brighter than a conventional source. The question is whether one can exploit the ultra-brightness of the source to enable structure determination of identical randomly oriented particles delivered to the beam by means of a sample delivery system specifically designed for this purpose. The particles will be delivered to the XFEL in a specially designed apparatus that delivers identical particles in random orientation. The question is whether one can determine the structure of the particles from the collection of diffraction patterns even though one does not know the precise orientation of the particle in each. We demonstrate a solution with experimental data for the icosahedral virus PR772 from an XFEL. What we exploit is the fact that the angular correlations amongst the intensities are independent of particle orientation. Consequently an average over all diffraction patterns of the angular correlation merely increases the accuracy of the angular correlation measurement. We have developed a method of extracting the X-ray diffraction volume from accurately determined angular correlations. An iterative phasing algorithm then recovers the electron density of the viruses from the diffraction volume.



Biography

Dilano K Saldin is a Professor at the Physics Department of the University of Wisconsin-Milwaukee, where he started as a Surface Physicist, but has over the past 10 years turned his attention to the problem of structure determination in the XFEL particularly of viruses.

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