

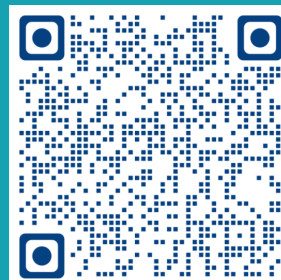


An efficient note-taking workflow for reading scientific articles

Integrate references and notes using the free software tools **Zotero** for reference management and **Obsidian** for note-taking

- Bring laptop and download Zotero and Obsidian – setup guide will be sent out in advance
- You will be guided through the workflow and receive support for the setup
- When: **Monday 4th May 14.00-15.30**
- Where: **Room 1872-547 at MBG**
- With: YoDA member **Seán Hansen**

Link to sign-up



Zotero



Obsidian

Workflow

Read and annotate article

Extract annotations to source file

Integrate source into subject notes

Obtain quick overview of read articles

1. Introduction

The first biological structure to be determined by three-dimensional electron microscopy (3D-EM), the extended tail of the T4 bacteriophage, had helical symmetry (DeRosier and Klug, 1968; DeRosier and Moore, 1970). An important advantage for structure determination of helical objects over asymmetrical particles lies in the observation that a single projection image of a helical specimen will typically contain all necessary information to perform a 3D reconstruction. Moreover, for helical reconstructions the number of parameters to be determined is, in principle, strongly reduced compared to single-particle analysis. That is because in single-particle analysis one needs to determine the relative orientations for every individual particle projection image, while for helical structures many copies of the repeating, asymmetrical unit have fixed relative orientations. Therefore, once the

space. The mathematical description of the Fourier transform of an object with helical symmetry was first proposed by Crick, Cochran and Vand (Cochran et al., 1952), and Klug generalised the theory afterwards (Klug et al., 1958). The initial step is to inspect 2D Fourier diffraction patterns of, sometimes averaged, and preferably long and straight helical filaments. The helical lattice can be regarded as a 2D surface lattice that is curled into a cylinder (also see Fig. 1). The curling effect causes a convolution of the Fourier transform of the 2D surface lattice with a cylindrical harmonic called the Bessel function. In the 3D Fourier transform of a helical object, discrete horizontal lines, called layer lines, arise from the periodicity along the helical axis. Through the central slice theorem, the radially oscillating ring-like amplitudes on each plane perpendicular to the z-axis in 3D Fourier space give rise to symmetrical maxima across the meridian on each layer line in the Fourier transforms of 2D projections. The position of the maxima along these lines

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Helical reconstruction in RELION

Shawn He, Scott H.W. Science (2017)

PDF

Link to Zotero

Link to article

Abstract

Notes

Referenced in

- Axonal ultrastructure

Annotations

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deals with deviations from perfect helical symmetry through deviations on the orientations of individual segments Page 163G

our implementation does not solve the problem that grossly incorrect structure can be obtained when the wrong helical symmetry is imposed Page 163G

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