

DigitalMicrograph
Plug-in

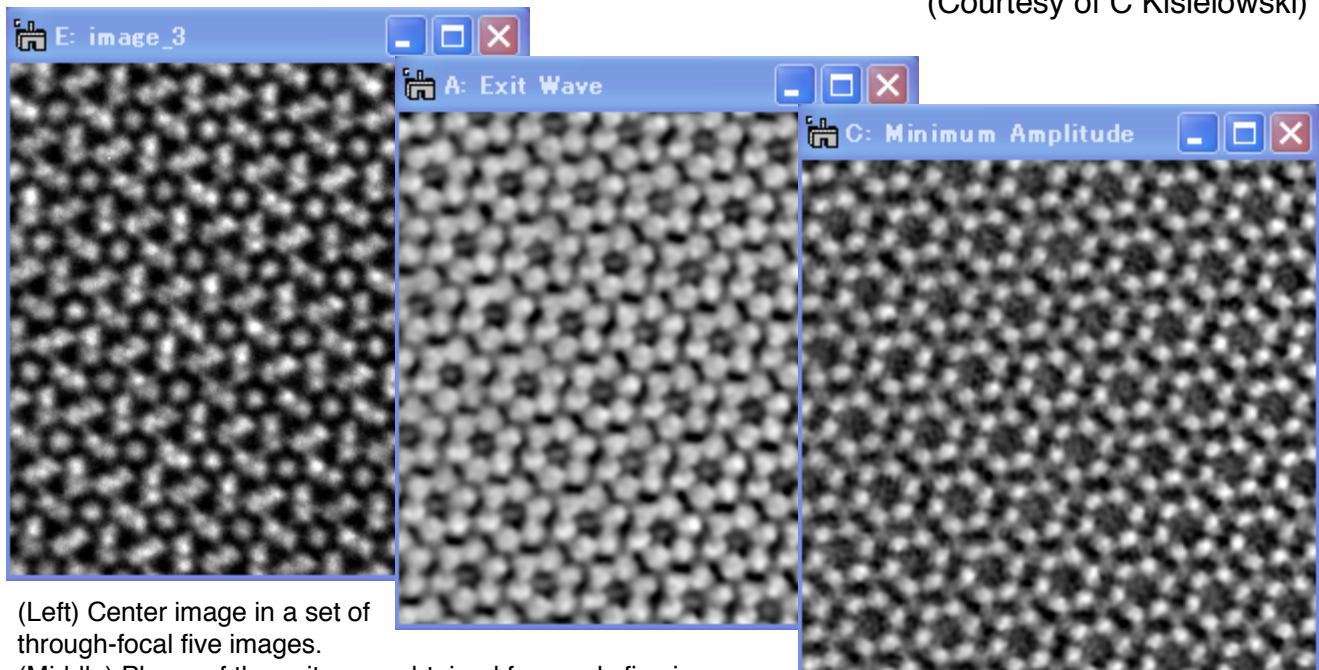
Software Cs-Corrector

IWFR

Iterative Wave Function Reconstruction

DigitalMicrograph Plug-in for Exit Wave Reconstruction

Si_3N_4 (Original Images were taken with a Philips CM300/FEG/UT at NCEM using a Gatan GIF)
(Courtesy of C Kisielowski)



(Left) Center image in a set of through-focal five images.

(Middle) Phase of the exit wave obtained from only five images.

(Right) Phase of the wave at the plane where amplitude contrast gives the minimum variation.

The IWFR works with a through focal series of HREM images to reconstruct a wave function at the specimen exit surface. The IWFR is a kind of Gerchberg-Saxton iteration (which originally uses a pair of a measured image intensity and a diffraction intensity to estimate a complex wave function) The IWFR uses a set of image intensities measured in different planes (a through-focal series), and reconstructs the complex wave at the specimen exit surface (at the zero-defocus plane). You should note that this method requires few images, as few as *five* (5) will suffice.

Using the obtained wave function you can correct optical aberrations such as spherical aberration. Therefore, the IWFR is a *software Cs-corrector*. The IWFR software consists of a suite of scripts and a Plug-In for use in DigitalMicrograph for Windows (Gatan Inc).

Details of the IWFR algorithm can be found in the following paper: L.J Allen, W. McBride, N.L. O'Leary and M.P. Oxley: Exit wave reconstruction at atomic resolution. *Ultramicroscopy* 100 (2004) 91-104.

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