

# Electron holography using Schottky field emission source: influence of the gun optical conditions

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Electron holography inside a transmission electron microscope can be used to retrieve the phase of the incident electron beam after crossing the sample. The characteristics of the obtained interference pattern (contrast, phase sensitivity, ...) are strongly related to the properties of the incident electron beam. Indeed, high brightness is required to obtain good holograms; hence the choice of the electron source is critical. Our experiments have been performed using a Schottky Field Emission Gun (SFEG), which is a good compromise between brightness and emission stability. However SFEG has a complex optics, including the adjustment of extraction voltage and gun lens, permitting to operate it in two major modes called "crossover" and "telefocus".

We have studied the influence of these SFEG parameters as well as the illumination optical configuration on the electron hologram quality. We have performed different experiments in order to better understand the influence of SFEG parameters, namely gun lens, extraction voltage, and condenser aperture settings on electron hologram quality, in both "crossover" and "telefocus" modes. We show a difference of behavior between these two modes and the influence of side-emission lobes. In order to better understand the physical origin of these lobes and their influence on the beam coherence, we have also performed electron energy loss spectroscopy on the emission lobes and compare it with the central emission.