



	Operational SOP	Date	June 26, 2023
	Helios NanoLab 660/G3	Revision	0.0
		Equipment Manager	Nicolas J. Briot


<p>Purpose: Basic operation of the ion beam on the Helios NanoLab 660 / G3 FIB-SEM</p>	
<p>Required PPE:</p> <div style="text-align: center;">  Nitrile or Latex Gloves </div>	




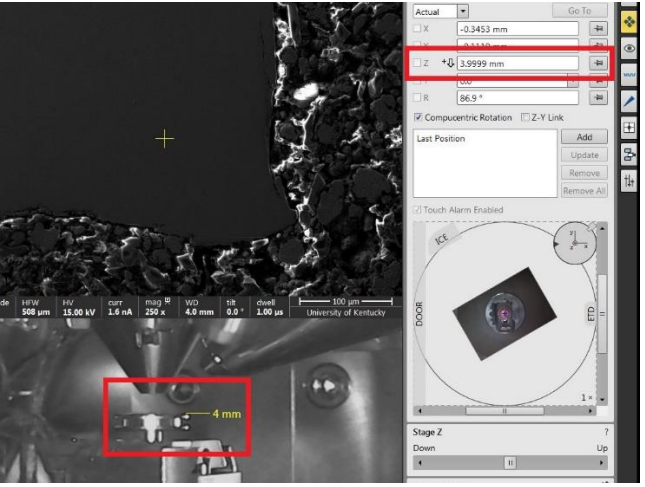
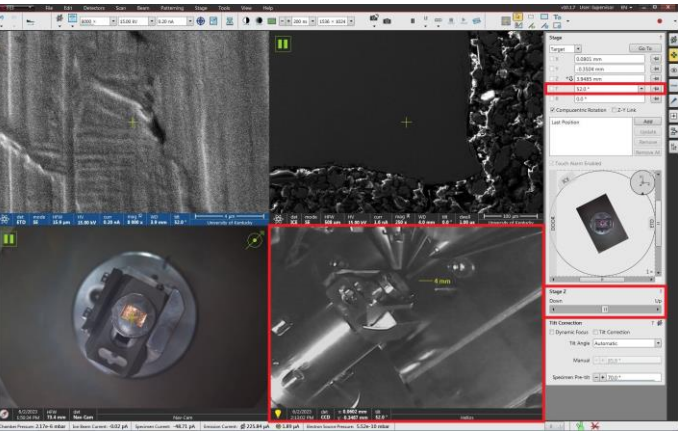
Helios NanoLab 660/G3


<p>Potential Hazards:</p> <div style="margin-bottom: 20px;">  <p>This instrument generates x-ray radiation when the electron and/or ion beam are ON.</p> </div> <div>  <p>Some parts of this instrument create strong magnetic fields, although not extending more than 15 cm (6 in).</p> </div>	
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<p>Reference Documents:</p> <ul style="list-style-type: none"> • Scanning Electron Microscopy and X-Ray Microanalysis, 4th Edition, Goldstein et al. 	
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<p>Required Equipment & Materials:</p> <ul style="list-style-type: none"> • SEM holders • SEM mounting accessories • Ethanol (optional) 	
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Steps	Key Points
<p>1. Mount, load, and take a Nav-Cam image of your sample as you would for electron beam imaging (refer to individual training).</p>	
<p>2. Linking WD and Stage Z</p> <ul style="list-style-type: none"> Operating the electron beam, bring the image of the sample's surface into focus at a medium magnification (~1000x). Link the working distance (WD) and the stage Z (refer to individual training, do not link the Z height without training). The Z value in the Navigation tab now reflects the WD of the electron beam and corresponds to the distance from the polepiece to the sample surface (as indicated by the downwards arrow). Bring the stage up to a Z position of 4mm. Re-adjust the focus and link WD and Z again. Bring the stage again to a Z position of 4mm. <p><i>At any time, push the Esc key on the keyboard to stop stage movement</i></p>	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="margin-bottom: 5px;">  Z height unlinked </div> <div style="margin-bottom: 5px;">  Z height linked </div> <div style="margin-bottom: 5px;">  Z height needs relinked </div> <div style="margin-top: 10px;">  </div> </div>
<p>3. Bringing the ROI to the eucentric height</p> <ul style="list-style-type: none"> Tilt the stage slightly ($\leq 5^\circ$) using the tilt setting in the "Navigation" panel. Note the direction in which the ROI moves in the field of view. Without changing the X and Y position of the stage, re-center the ROI using the Stage Z slider, being mindful of the position of your sample relative to the polepiece. Tilt the stage to the 52-degree position by steps so that you do not lose track of the ROI, adjusting the Z height of the stage as needed. 	

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<p>4. Select appropriate ion beam settings</p> <ul style="list-style-type: none"> • Select an image quad set to the ion beam, usually the top-right quad. • Select an accelerating voltage, typically 30kV. • Select a low beam current. • Select a low image resolution. • Select a low dwell time for fast scanning. 	
<p>5. Turning the ion beam ON</p> <ul style="list-style-type: none"> • Ensure that an image quad set to the ion beam is still selected (typically top-right quad). • Turn the ion beam on by going to the “Beam” tab and clicking the “Beam On” button. • Click on the pause button (or F6) to start scanning. • Be careful not to overexpose the sample to the ion beam. Pause the image quad when there is no immediate need for the beam. Use of the snapshot feature is encouraged. 	
<p>6. Electron / Ion beams correlation</p> <ul style="list-style-type: none"> • Using the beam shift on the ion beam, center the ROI observed in the electron beam image in the ion beam image. • Remember, physically moving under one beam will also lead to movement in the other beam! 	
<p>7. FIB cross-sectioning / TEM sample lift-out</p> <ul style="list-style-type: none"> • Refer to individual trainings. 	

