

How to install Cryo Nozzles for Macromolecular X-ray systems?

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- 1) The cryo nozzle should be installed at an angle that allows for the maximum possible swing angle for 2θ (if you have a sled with 2θ swing).
- 2) For partial Chi (κ) goniometers: do not mount the cryo nozzle right on top of the collimator because then you cannot mount the beam stop along the rotation axis.
NOTE: If you put the beam stop on the bottom of the cryo nozzle then you are blocking the Chi movement.
- 3) Make sure at the closest XTD distance the cryo nozzle does not leave a shadow on images. Take a test diffraction image and test this by increasing the contrast. For example see the image #1. By moving the cryo nozzle away from the detector and installing it at $\sim 45^\circ$ angle (image#3), instead of 90° (image #2) with respect to collimator the shadow will be gone.

NOTE: To see each of the images in this document in larger resolution, right click and then go to Format Picture > Size and type in a larger number for the Absolute size.

- 4) As you see in image # 3 moving the cryo, not only will remove the shadow from IP plates, but also will facilitate the hand mounts in the case that the camera was mounted in front, toward the user.
- 5) Mount a standard size pin on the goniometer to adjust the position of the cryo. When looking down through the cryo nozzle and co-axial though the nozzle you must see the loop in the center of the cryo nozzle and just barely lower from the center because the cold stream travels down. See Image 4.

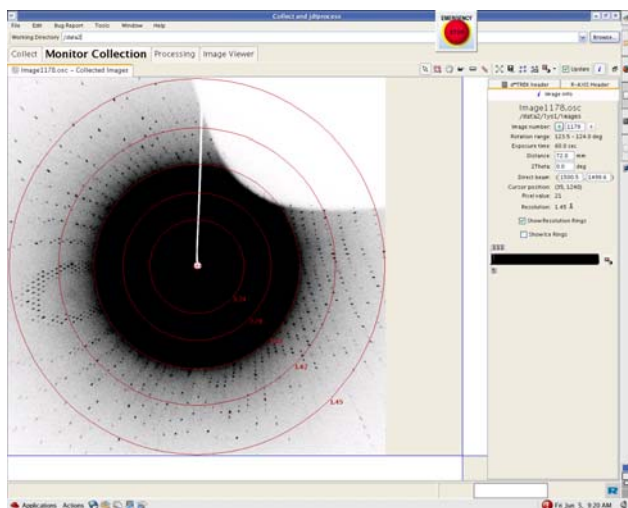


Image 1

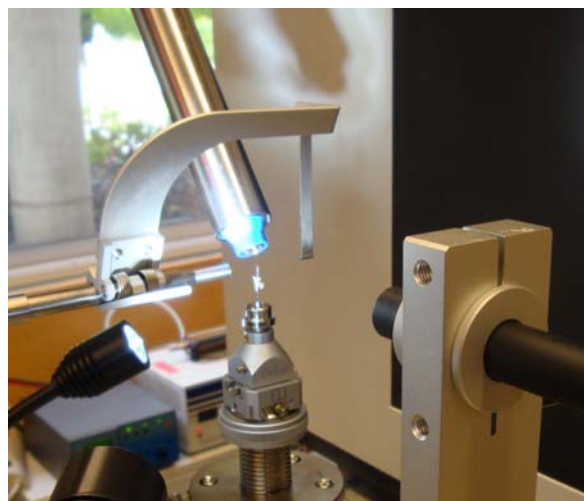


Image 2

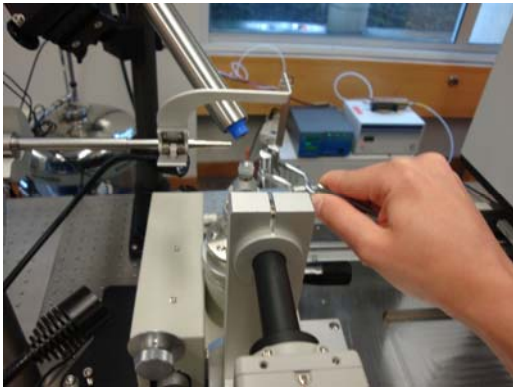


Image 3

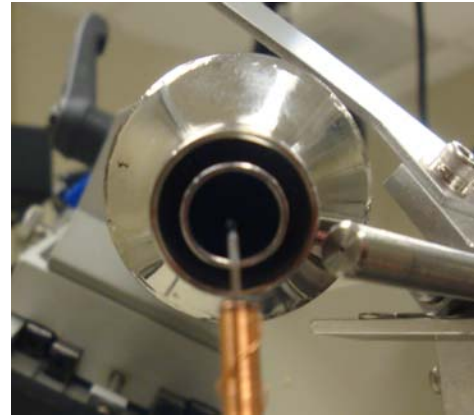


Image 4

- 6) The distance of the cryo nozzle from the loop should be minimized while avoiding any shadow on the detector.
NOTE: The cryo nozzle should be placed as close as possible to the sample but you should be careful to place the warm flow out of the way of collimator. See Image 4.
- 7) To test whether you have mounted the cryo in a correct position in terms of icing: Mount a loop with 50% glycerol (or another cryo protectant solution) and center the loop and let it sit on the goniometer for 15 minutes. If no ice forms on the loop the cryo position is set up right.
- 8) The cryo nozzle for macromolecular (protein) systems should have a $\sim 45^\circ$ angle with respect to the collimator plane except in the case of ACTOR system where this angle is smaller ($\sim 30^\circ$). See Image 5.

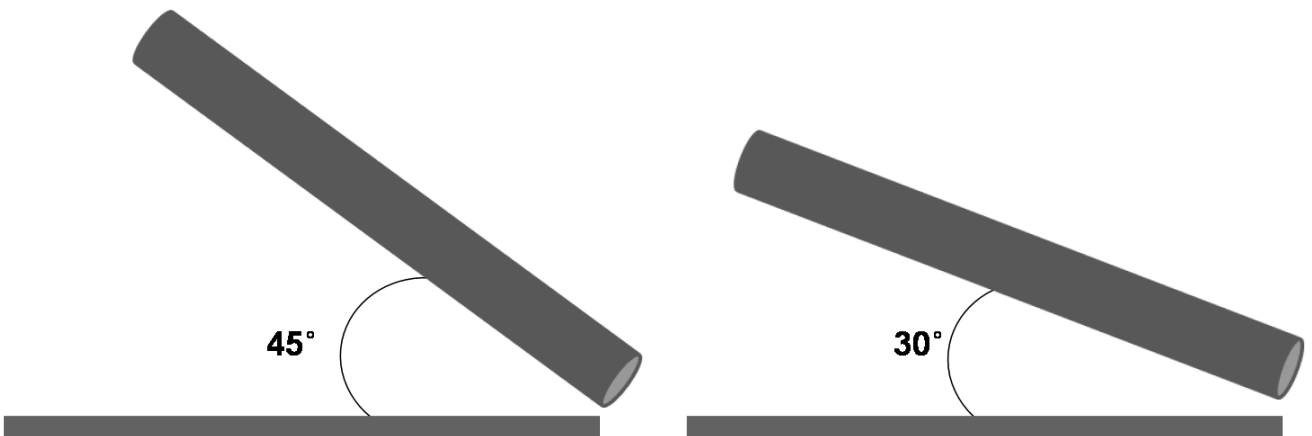


Image 5