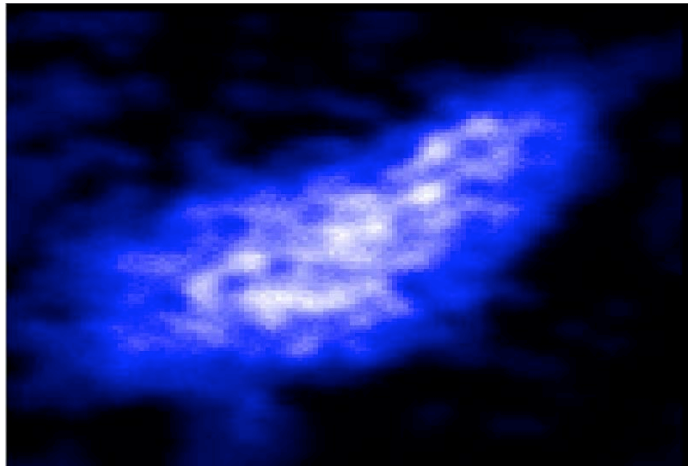


# Deconvolution of 3-D Fluorescence Microscopy Images

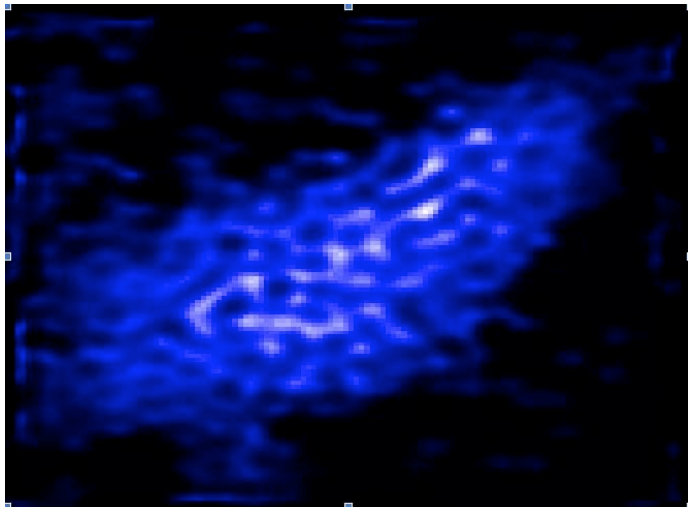
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Here you see two images of three-dimensionally rendered fluorescent beads. These images were attained by scanning the fluorescent beads with a multi-photon microscope. The top image is blurry, while the bottom image is much clearer. This is because the bottom image has gone through a process known as deconvolution. Deconvolution is when the blurry parts of an image are removed or filtered out. The main object that makes our images blurry is called the point spread function (PSF). The point spread function comes from the out of focus light of the laser that scans the beads. The other factor that adds blurriness to the image is noise. Here in our deconvolution process we have managed to filter out the excess noise, and take away the point spread function. This leaves us a close estimate of what the original image looked like.



The process of deconvolution used here is called the MLE algorithm. This process uses mathematical models and the known factors about the image to recreate the original image. If we can find a way to clear these images to show exactly how they look then we can build more powerful microscopes that can surpass the diffraction limit and get clear images are only a few nanometers long.

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