3D tracking of mRNA in the cell nucleus using aberration-corrected multi-color multi-focus microscopy (MFM)

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We have developed an aberration-corrected, multi-color single-molecule-sensitive 3D microscope (MFM) which allows us to simultaneously image single mRNA molecules (labeled in green) and nuclear pores (labeled in red) in live mammalian cells. We are able to track the mRNAs in 3D as they diffuse through the highly heterogeneous nuclear landscape and exit the nucleus into the cytoplasm. The DNA is also imaged (in blue) to give a picture of the chromatin distribution in the cell internal landscape. Our field of view is 33x33 um with nine focal sections of 250 nm separation.