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## Neural Networks for Super Resolution of X-Ray Line Emission Mapper Images

The line emission mapper (LEM) is a proposed X-ray probe for high spectral resolution survey observations targeting galaxies and clusters of galaxies to characterise the circumgalactic and intergalactic medium better. The mission will use a microcalorimeter array with 1-2 eV resolution, capturing individual emission lines and offering the ability to spatially map elemental emission within galaxies, supernovae remnants, and more. We propose two methods of machine learning super-resolution to enhance LEM's capabilities and bring the advantages of LEM to archival data. The first project will improve the spatial resolution of LEM by leveraging the high spatial resolution of Chandra and training a network to interpolate features from low-dimensional to high-dimensional space. The second project will apply machine learning to LEM observations to infer high-spectral resolution results from the vast archive of low-spectral resolution Chandra data. As LEM is still in development, we are presently working with simulated data sets for galaxies from which we generate mock observations with Chandra, LEM and a theoretical high spatial resolution version of LEM for training the network.

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