**Readme**

Figure 1 based on the crystal model in CrystalMaker from dataset 5981 in the Inorganic Crystal Structure Database from Bull, C. L., H. Y. Playford, K. S. Knight, G. B. G. Stenning and M. G. Tucker (2016). Magnetic and structural phase diagram of the solid solutionLaCoxMn1-xO3. Physical Review B 94, 014102. The data is in 5981-ICSD.

Figure 2 is created using the Figure2.ipynb notebook. This does require some special installs of libraries, including *hyperspy*, *emilys* and *atomap*. The raw data is provided.

Full raw datasets (RotSTEM – for the HAADF images and dead-pixel-corrected 4DSTEM datasets for the FOLZ measurements) for everything used in calculating Figure 3 are not provided due to the space that would be required. But these can be provided on request.

Figure 3 is created using the Figure3.ipynb notebook. This loads data saved with *pickle* as *pandas* DataFrames and then constructs the plot. This came from systematically running atomap fits with the range of parameters detailed in the notebook. The way the fit runs is basically using the code in the Figure2.ipynb notebook, just in a more abbreviated and automated form.

Figure 4 is created using the Figure4.ipynb. The definition of the crystal structure is in the notebook and needs no import. The notebook needs to be run with *py4dstem* installed and is checked and proven to work with 0.13.10. The CBED simulations are imported from a file provided.