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Speeding-up the extraction of morphological parameters in GISAXS data using a physics-informed deep learning approach

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In-situ grazing-incidence small-angle X-ray scattering (GISAXS) is a powerful technique for investigating nanoscale structures with high time resolution, yet data analysis is complex and time-intensive. To accelerate this process, we present a novel two-step approach that integrates physics-informed deep learning to extract key morphological parameters. The approach involves preprocessing GISAXS simulations using different techniques, including intensity thresholding, to generate training data for an artificial neural network (NN). Instead of single-value predictions, the NN is designed to forecast distributions of parameters, such as the average cluster radius, which has shown promising early results. While further development is needed, these initial successes indicate the potential of the method for more efficient GISAXS data analysis.

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