Contribution ID: **8** Type: **not specified**

AI Highlight -Learning Fully Semantic Representations across 1D, 2D, and 3D Scientific Data

Thursday, 19 June 2025 13:40 (20 minutes)

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 Join via Zoom: https://ukri.zoom.us/j/92256378528

Applying AI to the interpretation of scientific data often requires learning representations that are invariant to symmetries such as shifts, translations, and rotations. In this talk, I will present the Disentangling Autoencoder, an encoder–decoder framework designed to extract fully semantic and interpretable features from scientific data. The model is built on the principle that different symmetry transformations can be independently modeled and disentangled. Its architecture is easily adaptable to 1D, 2D, and 3D data, demonstrating its flexibility and generality. We validate the model on diverse datasets, including 1D optical absorption spectra, 2D protein and galaxy images, 4D-STEM data, and 3D crystal morphologies. The results show that the model enables interpretable representation learning and enhances downstream tasks such as classification, clustering, and semantic feature discovery across scientific domains.