

In this thesis, we developed a model of a variational autoencoder with residual connections, trained on a dataset of skyrmion lattices. Afterwards, we explored its ability to reconstruct lattices, to encode the information describing lattices into a low-dimensional latent space, and to generate new lattices from randomly sampled points in the latent space. We have shown that the reconstruction squared error between the lattice used as an input and the reconstructed lattice correlates with the number of defects in the lattice. This could be used for detecting defects in lattices. We have demonstrated that the model is able to encode physical properties such as the topological charge  $Q$  or mean magnetization  $M_Z$  of these lattices into the latent space. This comparison was done for multiple variational autoencoders, differing in the weight used to multiply their Kullback-Leibler divergence loss during the training.