

Assisting Neutron Science with Machine Learning techniques

José I. Robledo

Forschungszentrum Jülich, Jülich Centre for Neutron Science JCNS-2, 52428 Jülich ,
Germany

** j.robledo@fz-juelich.de*

Neutrons are intensively used as probe to study matter by means of different type of interactions, like absorption and scattering. These types of experiments provide complementary information to x-ray experiments and are widely used to characterize material properties, especially when hydrogen is present. There are several neutron sources worldwide to perform experiments that allow to obtain information from a sample, such as structural, magnetic or vibrational properties. Nowadays, large neutron facilities are under construction which will soon provide higher neutron fluxes. With these higher flux facilities in operation, it is expected that the neutron user community will increment significantly, and with it the volume of experimental data generated. This opens big opportunities for machine learning approaches in the data collection and data analysis instances.

In this talk I will present my research line, which combines virtual experiments with Machine Learning (ML) techniques to improve the data analysis and evaluation procedures in Small Angle Neutron Scattering (SANS) experiments. First, I will do a brief introduction on using the neutron as a probe for studying matter, and I will overview some current Machine learning applications in neutron science domain. Afterwards, I will present our strategy at Jülich Centre for Neutron Science (JCNS-2) to include ML techniques in the data analysis toolbox of the neutron user community. Particularly, I will show our approach in training convolutional neural networks for form factor classification based on a dataset of SANS 2D-images obtained by Monte Carlo neutron particle tracing simulations.