

Abstract Submitted  
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**Bayesian Neural Networks for Ray Reconstruction of Spectrographs**<sup>1</sup> M.P. KUCHERA, D. BAZIN, B.M. SHERRILL, National Superconducting Cyclotron Laboratory — Spectrograph ray reconstruction is an important consideration for data analysis of many modern spectrometer experiments. Typically, calculated inverse ion-optical maps are used to reconstruct ion trajectories through a magnetic system. A standard practice is to calculate ion-optical maps using programs such as COSY Infinity and then use a procedure to invert these maps. The inverse maps are used to reconstruct ion parameters at the object location from measurements at the spectrograph focal plane. This presentation will present our exploration of an alternate method, namely, the use of Bayesian Neural Networks, BNN, for the construction of transport maps using experimental data. In order to study the effectiveness of the training of the neural network, COSY Infinity maps were used to generate training data for the S800 spectrograph at the National Superconducting Cyclotron Laboratory. BNNs were trained from this generated data, where the exact map is known, and a study of the method will be presented. Among the factors that will be reported are an accuracy of the BNN mapping, a study of the amount of training data necessary to construct an accurate BNN, and what level of precision in the training data is necessary for an accurate mapping.

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