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The Machine Learning Epochs of Neutrinoless Double Beta Decay

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Neutrinoless Double Beta Decay ($0\nu\beta\beta$) is one of the primary research interests in particle and nuclear physics. As we enter the era of artificial intelligence, machine learning has grown exponentially in almost all types of $0\nu\beta\beta$ detectors. Thanks to its end-to-end nature, machine learning algorithms can easily surpass traditional algorithms by maximally extracting information from detectors. Furthermore, a well-interpreted machine learning analysis can reciprocally benefit the traditional analysis. However, the power of machine learning will not be fully unleashed unless we appropriately design and interpret the model. In this talk, I will discuss three critical components of a comprehensive machine learning analysis: model design, machine interpretability, and learning from the machine. The KamLAND-Zen and Majorana Demonstrator experiments demonstrate that these components will work reciprocally to improve the search sensitivity of $0\nu\beta\beta$.

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