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Deep learning for Directional Dark Matter search

The NEWSdm (Nuclear Emulsions for WIMP Search directional measure) is an underground Direct detection Dark Matter (DM) search experiment. The usage of recent developments in the nuclear emulsions allows probing new regions in the WIMP parameter space. The prominent feature of this experiment is a potential of recording the signal direction, which gives a chance of overcoming the "neutrino floor".

State of the art techniques lower the background contamination significantly, however, background rejection remains crucial for DM sensitivity. Deep Neural Networks were used for separation between potential DM signal and various classes of background.

In this work, we present the usage of deep 3D Convolutional Neural Networks in order to take into account the physical peculiarities of the data and achieve strong background rejection.

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