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Deep learning for sub-micron UCN position resolution using CMOS sensor

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High spatial resolution for ultracold neutron (UCN) measurement is highly desired for several UCN experiments such as UCN spectrometers, polarimeters, quantum physics, and quantum gravity. We describe the experimental UCN capture method using a room-temperature CMOS sensor and the nuclear reaction with boron-10. To obtain sub-micron position resolution, we explore the use of the open-source software Allpix Squared for data generation and deep learning for position prediction, and demonstrated sub-pixel and submicron resolution [1]. The automated analysis for sub-micron position resolution in UCN detection combined with the fast data rates of current and next generation UCN sources will enable improved precision for all modern UCN studies.

[1] X. Yue, et al., "Ultrafast CMOS image sensors and data-enabled super-resolution for multimodal radiographic imaging and tomography,"arXiv preprint arXiv:2301.11865 (2023).

Will the talk be given in person or remotely?

Remotely

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