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Determining the wavelength spectrum of neutrons on the NG6 beam line at NCNR JULIET IVANOV, NIST Center for Neutron Research — Historically, in-beam experiments and bottle experiments have been performed to determine the lifetime of a free neutron. However, these two different experimental techniques have provided conflicting results. It is crucial to precisely and accurately elucidate the neutron lifetime for Big Bang Nucleosynthesis calculations and to investigate physics beyond the Standard Model. Therefore, we aimed to understand and minimize systematic errors present in the neutron beam experiment at the NIST Center for Neutron Research (NCNR). In order to reduce the uncertainty related to wavelength dependent corrections present in previous beam experiments, the wavelength spectrum of the NCNR reactor cold neutron beam must be known. We utilized a beam chopper and lithium detector to characterize the wavelength spectrum on the NG6 beam line at the NCNR. The experimental design and techniques employed will be discussed, and our results will be presented. Future plans to utilize our findings to improve the neutron lifetime measurement at NCNR will also be described.

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