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Search for new internucleon short-range interaction in neutron scattering

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There are 4 known types of interaction in nature, but nowadays the existence of a new force mediated by new unknown bosons is widely discussed in the literature [1], [2]. This work deals with the application of a neutron scattering technique for the search for a new short-range interaction and for setting constraints on the coupling constant of such interaction.
The main idea is to perform an experiment of neutron scattering on the powder of silicon (powder diffraction) and to get the information on scattering amplitude dependence on scattering angle. Within this work the calculations showing the possibility of the idea were made. The coupling constant constraints were obtained using the calibration data of powder diffractometer SPODI from the FRM II reactor, Munich, Germany. It is shown that the new constraints are competitive with the existing ones. Performing a new full-time experiment is expected to provide an improvement of the constraints for about 2 orders for the interaction range $\lambda < 10^{-11}$ m.
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