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Bayesian Method in Parity-violating Electron Scattering Experiments

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The parity-violating electron scattering technique can be used to probe new physics beyond the Standard Model. High precision measurements of the parity-violating asymmetry with a variety of kinematics and targets enable scientific reach in particle physics, nuclear physics, and hadronic physics. To achieve precise measurements, experimental corrections to the measured asymmetries are required. Experimental corrections arise from background processes that are characterized by fractional dilution factors and background asymmetries.

In this talk, frequentist methods which are commonly used in the parity-violating electron scattering experiments will be reviewed, and Bayesian analysis is investigated to improve understanding of uncertainties introduced by experimental corrections. A Bayesian model is proposed to infer dilution factors and background asymmetries based on observed quantities. This allows for a better assessment of the uncertainties in the model.

To test the method itself, we will start with some sets of actual parameters to apply the model for generating a set of mock data and then move backward with the same model to extract the parameters.

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Please select: Experiment or Theory

Theory

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