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**Title:** Sub-Nanometer Level Model Validation for the SIM Interferometer

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**Abstract:**

The Space Interferometer Mission (SIM) flight instrument will not undergo a full performance, end-to-end system test on the ground due to a number of constraints. Thus, analysis and physics-based models will play a significant role in providing confidence that SIM will meet its science goals on orbit. The various models themselves are validated against the experimental results of several "picometer" testbeds. In this paper we describe a set of models that are used to predict the magnitude and functional form of a class of field-dependent systematic errors for the science and guide interferometers. This set of models is validated by comparing predictions with the experimental results obtained from the MicroArcsecond Metrology (MAM) testbed and the Diffraction testbed (DTB). The metric for validation is provided by the SIM astrometric error budget.