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Mechanical Design, Simulation, and Testing of Self-Aligning Gaussian Telescope and Stand for ITER LFS Reflectometer Diagnostic[1]
RACHEL BROUGHTON, Rose-Hulman Inst of Technology, MICHAEL GOMEZ, ALI ZOLFAGHARI, LEWIS MORRIS, Princeton Plasma Physics Laboratory — A self-aligning Gaussian telescope has been designed to compensate for the effect of movement in the ITER vacuum vessel on the transmission line. The purpose of the setup is to couple microwaves into and out of the vessel across the vacuum windows while allowing for both slow movements of the vessel, due to thermal growth, and rapid movements, due to vibrations and disruptions. Additionally, a test stand has been designed specifically to hold this telescope in order to imitate these movements. Consequently, this will allow for the assessment of the efficacy in applying the self-aligning Gaussian telescope approach. The motions of the test stand, as well as the stress on the telescope mechanism, have been virtually simulated using ANSYS workbench. A prototype of this test stand and self-aligning telescope will be built using a combination of custom machined parts and ordered parts. The completed mechanism will be tested at the lab in four different ways: slow single- and multi-direction movements, rapid multi-direction movement, functional laser alignment and self-aligning tests, and natural frequency tests. Once the prototype successfully passes all requirements, it will be tested with microwaves in the LFSR transmission line test stand at General Atomics.

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Rachel Broughton
Rose-Hulman Inst of Technology

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