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Improving the accuracy of fiducial displacements for gravitational wave detectors.[1] DRIPTA BHATTACHARJEE, Missouri University of Science and Technology, YANNICK LECOEUCHE, LIGO Hanford Observatory, Richland, WA, SUDARSHAN KARKI, Missouri University of Science and Technology, RICHARD SAVAGE, LIGO Livingston Observatory, Livingston, LA, PHOTON CALIBRATOR TEAM — Current gravitational-wave detectors employ Photon Calibrators (Pcals) that use the radiation pressure of power-modulated auxiliary laser beams to generate accurate and precise displacement fiducials for absolute length calibration. Accuracy of the fiducials is achieved by propagating laser power calibration from NIST via transfer standards to on-line power sensors monitoring the modulated laser power reflecting from an interferometer mirror. These Pcal-induced displacements are used to calibrate interferometer response functions. Reducing the uncertainty of the Pcal fiducial displacements reduces interferometer calibration uncertainty. Furthermore, referencing the laser power calibration standards for each observatory to a single transfer standard reduces relative calibration errors between the detectors in the network. In this talk, we will discuss the developments and improvements implemented during the recently-completed O3 observing run and some of the ongoing work for the future run to push the Pcal displacement uncertainty below the 0.5% level.

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