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Towards a Better Determination of Big G M. HUA, Indiana University - Purdue University Indianapolis, E. ORD, Humboldt State University, M. QUENTEN, Indiana University, G. MATTINGLY, H. ISACHSEN, R. GARVANKAR, N. FULLER, I. S. GUERRERO, Indiana University - Purdue University Indianapolis, A. TURK, Humboldt State University, W. M. SNOW, Indiana University, C. D. HOYLE, Humboldt State University, S. W. BALLMER, Syracuse University, R. S. DECCA, Indiana University - Purdue University Indianapolis, INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS COLLABORATION, HUMBOLDT STATE UNIVERSITY COLLABORATION, SYRACUSE UNIVERSITY COLLABORATION — Precise determination of Newtonian gravitational constant G is challenging when compared to other universal constants due to its extremely weak interaction strength. Meanwhile, more questions are raised in the accuracy among the G measurements as results disagree with each other. To improve the situation, a new apparatus based on the angular-acceleration-feedback torsion pendulum system has been designed and is being assembled in our lab. A precision about 2 ppm will be mainly achieved by increasing the system size, which reduces the metrological uncertainty. The disagreement among different approaches will be investigated by integrating another two modes into the same apparatus, (*i*) the time-of-swing method with large amplitudes and (*ii*) extracting the resonance frequency of the pendulum through noise measurements. The idea is to address the potential Kuroda effect by comparing G determined by three different methods in the same apparatus. The progress of the construction with system characterization data will be shown in the presentation.

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