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Towards A Better Determination of Big G[1] MUCHUAN HUA, Indiana University-Purdue University Indianapolis (IUPUI), G. MATTINGLY, IUPUI, H. ISACHSEN, IUPUI Humboldt State University, R. GAVANKAR, N. FULLER, I. S. GUERRERO, IUPUI, W. M. SNOW, Indiana University, C. D. HOYLE, Humboldt State University, S. W. BALLMER, Syracuse University, R. S. DECCA, IUPUI, SYRACUSE UNIVERSITY COLLABORATION, HUMBOLDT STATE UNIVERSITY COLLABORATION, INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS COLLABORATION — Newtonian gravitational constant G is poorly determined in both precision and accuracy (significant discrepancy between existing results) when compared to other universal constants. To improve the situation, a new torsion pendulum device is currently under construction in our lab with two major modifications. One is enlarging the scale of the system as the metrological uncertainty, the major contribution of the systematic error, decreases linearly as the scale increases. The other one is allowing the apparatus to measure G with three different modes (*i*) the angular-acceleration feedback method, (*ii*) the time-of-swing method with large amplitudes on the pendulum for two positions of the attractor masses, and (*iii*) extracting the resonance frequency of the pendulum through noise measurements for two positions of the attractor masses. The idea is to address the potential Kuroda effect by comparing G determined by different methods in the same apparatus. The progress of the apparatus construction with preliminary test results and other modifications, such as using better attractor masses, will be shown in the presentation.

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