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Rolling vs. Sliding: The inclusion of non-conservative work in the classic comparison BENJAMIN LEE, JUSTIN MUELLER, California Baptist University, TERRY BUEHLER, U.C. Berkeley, ALEX CHEDIAK, California Baptist University — If a rolling and sliding object, each of the same material, were to race down the same incline plane, which would win? Last year, we presented a theoretical model with confirming experimental data which showed that the winning object depends on the angle, the effective coefficient of friction, C, and kinetic coefficients of friction: If C $<$ μ_{k_block}, the rolling object is faster, but if C $>$ μ_{k_block}, the sliding object is faster. Though the materials were the same, we previously reported that the $\mu_{s_sphere}$was apparently not equal to μ_{s_block}. This year, we are directly determining the coefficients of friction using a force sensor, seeking to resolve this apparent discrepancy. We plan to report more accurate values of $\mu_{s_sphere}$and μ_{s_block} and, if they are found to be different, explain why. Steps will be taken to improve track uniformity. We will more precisely determine the transition angle, where the block becomes faster than the sphere, by taking data at smaller angular increments. In addition, we will incorporate results for rolling *with* slipping, as it is expected that as slipping increases, so will linear velocity, as less energy is lost to rotational kinetic energy. Beyond this, we hope to extend the model to different geometries (with different moments of inertia).

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