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Dark Energy and Measurements of Newton's Constant, G JAMES DONOVAN, Shimer College — The high uncertainty in G is commonly attributed to the weakness of gravity and the impossibility of shielding it. But this does not satisfy: excellent groups have measured G with well controlled, precise methods. Yet their results disagree, suggesting some unknown, uncontrolled factor is in play. What could that factor be? In a separate paper at this conference, Donovan demonstrates that cosmological Dark Energy follows from a yet-unnoticed consequence of quantum mechanics and the age of the universe. His Dark Energy field has known characteristics, allowing calculation of its gradient and the force it exerts. This talk describes a semi-classical approach to derive the equation describing the effective force that results from this energy. Like Newtonian gravity, the resulting force is proportional to mass but decreases as $1/r$, not $1/r^2$. This uncontrolled factor has a magnitude large enough to affect measurements of G in laboratory experiments with the size of the error depending upon the details of the apparatus. When this effect is estimated and subtracted from reported precise values of G, it accounts for most of the variation between measurements made by different groups.

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