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Why is it so difficult to measure big G?

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The determination of the Newtonian constant of gravitation, big G, continues to be one of Nature's greatest challenges to the skills and cunning of experimental physicists. The reasons: Big G is small, scientists are human, and error budgets are flawed. In spite of the fact that on the scale of the Universe, big G's effects are so big as to single handedly hold everything together, on the scale of a single research laboratory, big G's effects are so small that they go unnoticed. And, it is this "smallness" that makes the determination of this (seemingly unrelated to the rest of physics) fundamental constant so difficult. Furthermore, because they are human, scientists want to get the "right" (read previously obtained) answer; and this goal can affect their otherwise good judgment. Finally, error budgets are fundamentally flawed because they cannot make allowances for error sources that have not been thought of. During its nearly 300 year measurement history, the accuracy with which G is known has barely increased by three orders of magnitude; during the past 30 years the progress, measured by agreement rather than claimed accuracy of individual measurements, has been essentially zero. Nevertheless, this Mount Everest of precision measurement continues to provide an experimental challenge upon which metrologists can hone their laboratory skills for generations to come. Finally, this presentation will be understandable and interesting for "students of all ages." In this year of GR100, Einstein will be mentioned more than once, and my hope is that some of you who would not normally "risk" attending a talk outside of your own specialty or discipline will consider coming to this one.