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The Development Challenges of Gravity Probe-B – an ongoing partnership between Physics and Engineering.

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Gravity Probe-B is very simple in concept: orbit four gyroscopes to measure the coordinate-frame deflections predicted by GR to milli-arc second accuracy. In reality it proved almost overwhelming. It took over 40 years to develop the Technology, and to engineer the complex payload which is intimately united with the spacecraft. This achievement was critically dependent on the partnership of Physics and Engineering at Stanford. Without this relationship, the mission would surely have failed. The late Professor Bill Fairbank described these challenges as the seven near-zeros of GP-B. The “near zeros” include magnetic field, atmospheric pressure, acceleration, and temperature. To be successful, the payload must meet all these requirements *at the same time* for the duration of the 16 month experiment. This talk will describe some of these essential “near zero” technologies, and point out where both Physics and Engineering made vital contributions. Equally important, many of these developments are now being incorporated into other Fundamental Physics Experiments in Space.