

**Mini-STEP**  
A Minimal Satellite Test of the Equivalence Principle Experiment

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The Mini-STEP idea was conceived from a desire by NASA to reduce the cost of the Satellite Test of the Equivalence Principle (STEP) experiment below that of the already downsized Quick STEP concept. The goal was for the total cost, including launch vehicle and reserves to be in the \$50 m range. Stanford University and the Jet Propulsion Lab studied this simplified STEP concept between March and June 1995.

The Mini-STEP approach was to start with the Quick STEP concept and reduce every component to the smallest, least expensive available. The most expensive items in Quick STEP were the instruments, spacecraft and launch vehicle, in that order. The payload is now reduced from four differential accelerometers and a gradiometer to only two differential accelerometers (from six to two test masses). A semi-production spacecraft planned for a communications constellation was selected for its small size and simplicity. By reducing the total system mass from 390 kg to 290 kg, a less expensive LLV- 1 launch vehicle can place the payload in a 400 km, sun-synchronous polar orbit. Due to the simpler payload, the mission duration is reduced to less than four months. Science has been somewhat weakened by eliminating the geodesy experiment. In addition, the smaller number of test masses means fewer materials can be tested and redundancy is reduced. However, the primary experiment of measuring the Equivalence Principle to 10<sup>-17</sup> is unchanged.

Stanford University will design and build the payload with the likelihood of international collaboration in subsystem components. NASA will manage the project through the Jet Propulsion Laboratory .