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Architectures for a Space-based Gravitational-Wave Observatory
ROBIN STEBBINS, NASA/GSFC; The NASA Gravitational-Wave Study Team — The European Space Agency (ESA) selected the science theme, the "Gravitational Universe," for the third large mission opportunity, known as L3, under its Cosmic Vision Programme. The planned launch date is 2034. ESA is considering a 20% participation by an international partner, and NASA's Astrophysics Division has begun negotiating a NASA role. We have studied the design consequences of a NASA contribution, evaluated the science benefits and identified the technology requirements for hardware that could be delivered by NASA. The European community proposed a strawman mission concept, called eLISA, having two measurement arms, derived from the well studied LISA (Laser Interferometer Space Antenna) concept. The US community is promoting a mission concept known as SGO Mid (Space-based Gravitational-wave Observatory Mid-sized), a three arm LISA-like concept. If NASA were to partner with ESA, the eLISA concept could be transformed to SGO Mid by the addition of a third arm, thereby augmenting science, reducing risk and reducing non-recurring engineering costs. The characteristics of the mission concepts and the relative science performance of eLISA, SGO Mid and LISA are described.

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