

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
- LIGO -
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**Cosmography and Black Hole
Spectroscopy by Coherent
Synthesis of the Terrestrial and
Space GW Antennae Network:
Orbit Optimization**

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Gravitational waves (GWs), oscillations of spacetime that propagate at the speed of light, may soon become a very helpful tool for exploring the universe from an absolutely novel point of view. All gravitational wave detectors existing at the moment are ground-based and therefore are limited by seismic noise at low frequencies. Thus new concepts of space detectors have been presented. One possibility is the Laser Interferometer Space Antenna (LISA), a constellation of three satellites which forms an equilateral triangle with million kilometer long arms. But due to its large cost it will likely not be launched until the mid-2030s. Thus other new simpler and cheaper LISA-like missions have to be proposed. One alternative to LISA is a smaller mission, using 100 kilometer arms and fewer lasers. In order to measure gravitational waves, this satellite formation must remain stable over a several year period. Here, we determine the most stable orbital configuration by determining the optimal parameters of the satellites such as initial positions of the spacecraft and their velocities, the semimajor axis of a desired orbit, inclination and arm length.