ZAIGA: Zhaoshan long-baseline Atom Interferometer Gravitation Antenna

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Long baseline interferometers with electromagnetic waves, such as VLBI, SKA, LIGO, VIRGO, and KAGRA have been well developed and widely used in astronomy and gravitational wave detection. On the other hand, large scale atom interferometers (AIs) with matter waves have also been proposed and built recently in several laboratories, including our 10-m AI in Wuhan [1–4]. With the success of these AIs, we are initiating a new project, the ZAIGA, for gravitational study. ZAIGA is an underground facility located at Zhaoshan, a maintain in outskirts of Wuhan city. It consists of a vertical tunnel of 300 m high and a horizontal equilateral triangle cave with sides 3 km long. It will be a home for large scale AIs, optical atomic clocks, and laser or atomic gyros. It serves as a platform for high precision fundamental physics and geophysics experiments, e.g. the weak equivalence principle test, local position invariance test by gravitational red-shift, measurement of the Lense-Thirring effects, and mid-band gravitational wave detection.

Keywords: Atom interferometer, Weak equivalence principle, Gravitational wave

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