

Scientific Objective and Infrastructure of Space Exploration (1)  
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## DETECTION METHOD FOR LOW-FREQUENCY GW BY EARTH-MOON SPACE RADIO DOPPLER AND RANGING MEASUREMENTS

### **Abstract**

In the field of space low-frequency gravitational-wave detection, the high-precision microwave Doppler measurement based on the ground tracking station has been performed for more than 40 years. During the extension phase of Chang'E-3 lander, lunar microwave ranging technology of sub-millicycle accuracy was realized based on the independent development planetary radio receiver. Then use the raw data of lunar-earth ranging measurement in X-band, after the deduction of the earth atmospheric aberration, ionospheric disturbance, ground equipment thermal noise and the interplanetary plasma influence, the microwave differential ranging and velocity measurement of higher accuracy was verified. Using this technology, a scheme which is using differential ranging and velocity measurement in Chang'E-4 2-way and 4-way measurement is proposed as a precursor technology. On these bases, using the microwave link of Chang'E-3 lander and the communication navigation satellite in L4/L5 libration points, a new method of low-frequency gravitational-wave detection, which has the very high sensitivity is proposed.