

JUICE-GALA : Design of receiver telescope and related optics

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Ganymede Laser Altimeter (GALA) is scheduled on board JUICE mission by ESA to be launched in 2022. GALA will be developed and manufactured jointly by teams of Germany, Japan, Switzerland, and Spain. Japanese team is responsible for receiver telescope, backend optics (BEO), APD detector, and analog electronic unit.

Receiver telescope is Cassegrain type reflector whose aperture is 250mm or 300mm, which collects laser echo pulses from Ganymede's surface and guides to APD detector through backend optics (BEO). Telescope's field of view is $450\mu\text{rad}$ which covers laser beam expansion angle ($100\mu\text{rad}$.) and reduces noise signal to APD as small as possible. We have designed 300 mm aperture model in which distance between primary and secondary mirror is less than 160mm using Code V software. In parallel we compared two types of BEO using Code V again and confirmed both types satisfy GALA specification; one type of BEO is comprised of 1 folding mirror and 2 convex lenses and the other is comprised of 2 concave mirrors. The narrow band filter for laser echo (wavelength 1064nm; band width 8nm) is also confirmed available from a Japanese optics manufacturer. Primary and secondary mirrors and supporting structures will be fabricated of aluminum to realize athermal property and surfaces of two mirrors will be sputtered of gold to enhance total throughput of telescope. Thermal vacuum and radiation tolerance test of gold sputtered aluminum samples, filter material, and BEO elements is an important issue and will be conducted within 2015. It is also a critical issue how to establish the way to realize accurate alignment between laser transmitting telescope (German side) and receiver telescope (Japanese side).

Practically, GALA optical system cannot be determined by only optical design itself because it is closely related or depending on weight resource management and results of thermal or structural investigation of GALA. In our poster presentation the newest development status of GALA optical system will be reported.

Keywords: JUICE, GALA, telescope, BEO, Ganymede, athermal