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The Schwarzschild-Chang off-axis telescope is a “linear astigmatism-free” confocal system. The telescope comprises two pieces of aluminum-alloy freeform mirrors that are fabricated with diamond turning machine (DTM) process. We designed optomechanical structures where optical components in the telescope system can be adjustable on a linear stage. Optomechanical deformation caused by the weight of system itself and its temperature variation is analyzed by the finite element analysis (FEA). The results show that the deformation is estimated in the tolerance range. For the optic-axis alignment of telescope system, three-point alignment (TPA) method is chosen. The TPA method uses three parallel lasers and a plane mirror. Point source images were taken from collimated light and field observation. The performance of optical system was tested by point spread function and aberration measurement of the point sources.

#### [포 AT-02] Improvement and quasi optical analysis of wide band prototype feedhorn for ASTE focal plane array

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As an upgrade we report the current ASTE ultra-wideband corrugated horn design. The length of the feedhorn gets shortened from 12.5 mm to 11 mm, and it shows better side lobe level at the far-field patterns compared with the previous design.

We looked into possible quasi-optical solution to match the feedhorn beam to the optics of the current ASTE telescope, starting from frequency-independent solution using two ellipsoidal mirrors to which wideband performance of the feedhorn naturally fits. We used a commercial physical optics package (GRASP) with an user-defined optimizer to give physical

constraints to evaluated optical designs for highest efficiency.

#### [포 AT-03] Design of Integrated Control Software for Automated Observing System

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Remote and robotic telescopes are the most effective instrument for astronomical survey projects. The system is based on the dynamic operation of all astronomical instruments such as dome and telescope control system (TCS), focuser, filter wheel and data taking camera. We adopt the ASCOM driver platform to control the instruments through the integrated software. It can convert different interface libraries from various manufacturers into a uniform standard library. This allows us to effectively control astronomical instruments without modifying codes. We suggest a conceptual design of software for automation of a small telescope such as the new wide-field 0.25m telescope at McDonald Observatory. It can also be applied to operation of multi-telescopes in future projects.

#### [포 AT-04] Fabrication of Freeform Aluminum mirrors for Wide Field Infrared Telescopes

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Single Point Diamond Turning (SPDT) is a cost-effective technique to fabricate metallic mirrors. In particular, the servo-assisted diamond turning option is highly useful for the fabrication of freeform surfaces. However, the SPDT process