

## Development of new occulting mask for observation of faint emission around planet : Application of DMD

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We are developing a new occulting mask for observation of the planets.

When we are going to see faint emission close to a planet, and if a bright source (planetary disk) is in a field of view (FOV) simultaneously, stray light due to scattering in the telescope deteriorates the S/N ratio of the faint object. Mask is used for preventing such stray light from the bright disk. As an example, coronagraph is used for observation of the solar corona. For example, when we try to make observation of the Io plasma torus (IPT), stray light due to Jupiter disk always degrades the observation of IPT. In order to prevent such situation, a dense filter is usually put to mask the Jupiter disk. However, the Io disk still obstructs observation of IPT in a region close to Io because Io moves relative to Jupiter during observation. Therefore, a mask that can be variable in its position and also in its shape in the FOV is strongly desirable.

In order to achieve this, we are developing an occulting mask that employs DMD (Digital micromirror device). DMD is a device which can select the light incident on it by flipping a tiny mirrors (13 $\mu$ m x 13 $\mu$ m), arranged in an array of 1024 x 768, by +/- 12 degree relative to the array surface. Each tiny mirror element can be independently controlled by a PC.

By placing a such new DMD mask at the primary focus of the telescope, we will be able to make for better observation of not only IPT mentioned earlier, but also observation of the inner planets like Mercury will be much improved.

Based on preliminary experiment performed so far, it is confirmed that unwanted light can be reduced to  $10^{-3}$ ~ $10^{-4}$ , and this is expected to be sufficient for observation of IPT.

Current states of the development will be given at the presentations.