[구ID-15] Improved measurement uncertainty of photon detection efficiency for single pixel Silicon photomultiplier

Seul Ki Yang[1,2], Hye-Young Lee[3], Jina Jeon[3], Sug-Whan Kim[1,2,5], Jik Lee[3], Il H. Park[3,4]

[1]*Dept. of Astronomy, Yonsei University, Korea,*
[2]*Institute of Space Science and Terminology, Yonsei University, Korea,*
[3]*Research Center of the MEMS Space Telescope, Dept. of Physics, Ewha Womans University, Korea*
[4]*Institute for the Early Universe, Ewha Womans University, Korea*
[5]*Yonsei University Observatory, Yonsei University, Korea*

We report technique used for improved measurement uncertainties for Photon detection efficiency(PDE) of 1 mm^2 single pixel SiPM. It consists of 470nm LED light source, two 2-inch integrating sphere and two NIST calibrated silicon photodiodes that have ± 2.4% calibration error. With raytracing simulation of our experimental setup, we predict number of photon into SiPM and measurement uncertainty. For MPPC, Hamamatsu suggested PDE(1600 micro pixel) including crosstalk and afterpulse is 23.5% at 470 nm. By using new low calibration error photodiode and raytracing simulation, our simulation result has ± 3% measurement uncertainty. The technical detail of measurement, simulation are presented with the results and implication.

[구ID-16] Real scale lunar apparent albedo and moonshine simulation with improved 3D lunar optical model with Apollo 10084 soil sample

Jinhee Yu, Sug-Whan Kim

Space Optics Laboratory, Yonsei University,
Institute of Space Science and Technology, Yonsei University,
Yonsei Observatory, Yonsei University

Using Fresnel reflection and Hapke BRDF model with Apollo 10084 soil sample's scattering properties, we constructed a real scale optical lunar model and used it to simulate lunar apparent albedo and moonshine. For Fresnel reflection, the refractive index of 1.68±0.5 was used. For Hapke BRDF parameters from BUGs BRDF measurement, the single scattering with w=0.33, hot spot width h=0.017, average phase angle ζ=-0.086 and Legendre polynomial coefficients b=0.308, c=0.425 in wavelength 700nm with two types of Henyey-Greenstein phase function was applied. The computation model includes the Sun as a Lambertian scattering sphere, emitting 1.5078 W/m2 at 700nm in wavelength. The Sun and Moon models were then imported into the IRT based radiative transfer computation. The trial simulation of the irradiance levels of moonshine lights shows that they agree well with the ROLO measurement data. We then estimate the lunar apparent albedo to 0.11. The results are to be compared with the measurement data.