## [구IM-09] Subtraction of Smooth Foregrounds in Future 21-cm Observations

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One of the main challenges for future 21-cm observations is to remove foregrounds which are several orders of magnitude more intense than the HI signal. We propose a new technique for removing foregrounds of the redshifted 21-cm observations. We consider multi-frequency interferometer observations. We assume that the 21-cm signals in different frequency channels are uncorrelated and the foreground signals change slowly as a function of frequency. When we add the visibilities of all channels, the foreground signals increase roughly by a factor of N because they are highly correlated. However, the 21-cm signals increase by a factor of sqrt{N} because the signals in different channels contribute randomly. This enables us to obtain an accurate shape of the foreground angular power spectrum. Then, we obtain the 21-cm power spectrum by subtracting the foreground power spectrum obtained this way. We describe how to obtain the average power spectrum of the 21-cm signal.

## [구IM-10] Disk-averaged Spectra Simulation of Earth-like Exoplanets with Ray-tracing Method

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The understanding spectral characterization of possible earth-like extra solar planets has generated wide interested in astronomy and space science. The technical central issue in observation of exoplanet is deconvolution of the temporally and disk-averaged spectra of the exoplanets. The earth model based on atmospheric radiative transfer method has been studied in recent years for solutions of characterization of earthlike exoplanet. In this study, we report on the current progress of the new method of 3D earth model as a habitable exoplanet. The computational model has 3 components 1) the sun model, 2) an integrated earth BRDF (Bi-directional Reflectance Distribution Function) model (Atmosphere, Land and Ocean) and 3) instrument model combined in ray tracing computation. The ray characteristics such as radiative power and direction are altered as they experience reflection, refraction, transmission, absorption and scattering from encountering with each all of optical surfaces. The Land BRDF characteristics are defined by the semi-empirical "parametric-kernel-method" from POLDER missions from CNES. The ocean BRDF is defined for sea-ice cap structure and for the sea water optical model, considering sun-glint scattering. The input cloud-free atmosphere model consists of 1 layers with vertical profiles of absorption and aerosol scattering combined Rayleigh scattering and its input characteristics using the NEWS product in NASA data and spectral SMARTS from NREL and 6SV from Vermote E. The trial simulation runs result in phase dependent disk-averaged spectra and light-curves of a virtual exoplanet using 3D earth model