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Very Long Baseline Interferometry (VLBI) at millimeter wavelengths results in the highest angular resolutions achieved in astronomy and has a unique access to emission regions that are inaccessible with any other approach or at longer wavelengths. The simultaneous multi-frequency VLBI system in the Korean VLBI Network (KVN) is considered one of the most effective systems for compensating the atmospheric phase fluctuations, which is particularly bothersome at mm-VLBI. We have been demonstrating its performance and uniqueness at mm-VLBI observations. As a results, international VLBI partners from Japan, China, Australia and EU have expressed their interest on the KVN style simultaneous multi-frequency system. In this talk, we will report the activities for extending the simultaneous multi-frequency system to global VLBI network and introduce its science driver, measuring AGN core-shift effects.

[구 AT-04] Benchmark Results of a Radio Spectrometer Based on Graphics Processing Unit

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We set up a project to make spectrometers for single dish observations of the Korean VLBI Network (KVN), a new future multi-beam receiver of the ASTE (Atacama Submillimeter Telescope Experiment), and the total power (TP) antennas of the Atacama Large Millimeter/ submillimeter Array (ALMA). Traditionally, spectrometers based on ASIC (Application-Specific Integrated circuit) and FPGA (Field-Programmable Gate Array) have been used in radio astronomy. It is, however, that a Graphics Processing Unit (GPU) technology is now viable for spectrometers due to the rapid improvement of its performance. A high-resolution spectrometer should have the following functions: poly-phase filter, data-bit conversion, fast Fourier transform, and complex multiplication. We wrote a program based on CUDA (Compute Unified Device Architecture) for a GPU spectrometer. We measured its performance using two GPU cards, Titan X and K40m, from NVIDIA. A non-optimized GPU code can process a data stream of around 2 GHz bandwidth, which is enough for the KVN spectrometer and promising for the ASTE and ALMA TP spectrometers.

태양계

[구 SS-01] Near-IR Radiative Transfer Process for the Hazy Atmosphere of Titan

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Radiative transfer programs have been developed to simulate near-IR spectra of Titan. The formalism of the radiative transfer calculations includes the absorption and emission lines of CH_4, C_2H_2, C_2H_6, and HCN, and continua produced by Titanian haze particles. Absorption and scattering of sunlight by haze particles are considered by employing a two-stream approximation and a spherical-shell model for the atmospheric layers of Titan. Various constraints on the radiative transfer calculations for generating synthetic spectra will be discussed and presented. Several examples of comparisons between the synthetic spectra and recent spectral observations of Titan will also be presented.

[구 SS-02] KISO/KWFC Observation of the Dust Ejecta Associated with the 2007 Outburst of 17P/Holmes

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The 2007 event occurred at 17P/Holmes is known as the most energetic cometary outburst in the history of modern astronomical observations. At this conference, we report our new observation of the comet one orbital period after the event. We thus made the observation of 17P/Holmes in 2014 September using the Kiso Wide Field Camera (KWFC) attached to the 105 cm Schmidt telescope at the Kiso Observatory. It is known that dust particles are thought to converge on the orbital