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Development of a 12-20 GHz CO Intensity Mapping Receiver for Capturing the Star-formation History in the Early Universe

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Line-intensity mapping (LIM) is an observational technique that has recently been actively used in astronomy and astrophysics research. LIM utilizes relatively small aperture telescopes to perform large-area surveys, effectively analyzing the brightness distribution of galaxies and intergalactic medium through their spectral line emissions. Probing astrophysics and cosmology using LIM has been gaining attention, with several experiments already in operation or planning deployments.
Among these is the carbon monoxide (CO) Mapping Array Project (COMAP), which uses CO line emission to explore molecular gas that traces star formation. The COMAP Pathfinder currently observes at 26-34 GHz to measure the CO power spectrum at redshifts 2.4-3.4, near the peak of the star formation in cosmological history. In this presentation, I will introduce the planned development of a prototype receiver that will be operating in the 12-20 GHz range to study the 115.27 GHz CO line emission originating from z=4.8-8.6 near the epoch of reionization.

Presenter: Prof. KIM, Junhan (KAIST)

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