## [구IM-07] Phosphorus in the Young Supernova Remnant Cassiopeia A

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Phosphorus ($^{31}$P), which is essential for life, is thought to be synthesized in massive stars and dispersed into interstellar space when these stars explode as supernovae (SNe). Here we report on near-infrared spectroscopic observations of the young SN remnant Cassiopeia A, which show that the abundance ratio of phosphorus to the major nucleosynthetic product iron ($^{56}$Fe) in SN material is up to 100 times the average ratio of the Milky Way, confirming that phosphorus is produced in SNe. The observed range is compatible with predictions from SN nucleosynthetic models but not with the scenario in which the chemical elements in the inner SN layers are completely mixed by hydrodynamic instabilities during the explosion.

## [구IM-08] Dust Scattering in Turbulent Media: Correlation between the Scattered Light and Dust Column Density

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Radiative transfer models in a spherical, turbulent interstellar medium (ISM), in which the photon source is situated at the center, are calculated to investigate the correlation between the scattered light and the dust column density. The medium is modeled using fractional Brownian motion structures that are appropriate for turbulent ISM. The correlation plot between the scattered light and optical depth shows substantial scatter and deviation from simple proportionality. It was also found that the overall density contrast is smoothed out in scattered light. In other words, there is an enhancement of the dust-scattered flux in low-density regions, while the scattered flux is suppressed in high-density regions. The correlation becomes less significant as the scattering becomes closer to being isotropic and the medium becomes more turbulent. Therefore, the scattered light observed in near-infrared wavelengths would show much weaker correlation than the observations in optical and ultraviolet wavelengths. We also find that the correlation plot between scattered lights at two different wavelengths shows a tighter correlation than that of the scattered light versus the optical depth.