[포IM-09] Young Stellar Objects and Dense Clouds in the W51 Region

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We present infrared and millimeter observations of the active star-forming complex W51. A 1.25 deg × 1.00 deg region that includes the W51 complex was covered in the J = 2 - 1 transition of the ^{12}CO and ^{13}CO molecules with the University of Arizona Heinrich Hertz Submillimeter Telescope. We use a statistical equilibrium code to estimate physical properties of the molecular gas. Using Spitzer data we identify young stellar objects (YSOs) and fit model spectral energy distributions to these sources and constrain their physical properties. We compare the molecular cloud morphology with the distribution of infrared and radio continuum sources and find associations between molecular clouds and YSOs. We estimate that about 1% of the cloud mass is currently in YSOs.

[포IM-10] The Spectra Investigation of the Halo Planetary Nebula BoBn 1

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The extremely metal-poor halo planetary nebula BoBn 1 has been investigated based on IUE archive data, Subaru/HDS spectra, VLT/UVES archive data, and Spitzer/IRS spectra. We have measured a heliocentric radial velocity of +191.6±1.3 kms^{-1} and expansion velocity 2Vexp of 40.5±3.3 kms^{-1} from an average over 300 lines. The estimations of C, N, O, and Ne abundances from the optical recombination lines (ORLs) and Kr, Xe, and Ba from the collisional excitation lines (CELs) are also done. We have detected 5 fluorine and several slow neutron capture elements (the s-process). The amounts of [F/H], [Kr/H], and [Xe/H] suggest that BoBn 1 is the most F-rich among F detected PNe and is a heavy s-process element rich PN. The photo-ionization models built with non-LTE theoretical stellar atmospheres indicate that the progenitor was a 1-1.5 $M_\star$ that would evolve into a white dwarf with an 0.62$M_\odot$ core mass and 0.09$M_\odot$ ionized nebula. Careful examination implies that BoBn 1 has evolved from a binary and experienced coalescence during the evolution to become a visible PN. The elemental abundances except N could be explained by a binary model composed of 0.75$M_\odot$+1.5$M_\odot$ stars.