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The origin of dust in the early Universe has been the subject of considerable debate. Core-collapse supernovae (ccSNe), which occur several million years after their massive progenitors form, could be a major source of that dust, as in the local universe several ccSNe have been observed to be copious dust producers. Here we report nine near-infrared (0.8 - 2.5 micron spectra of the Type II-P SN 2017eaw in NGC 6946, spanning the time interval 22 - 205 days after discovery. The spectra show the onset of CO formation and continuum emission at wavelengths greater than 2.1 micron from newly-formed hot dust, in addition to numerous lines of hydrogen and metals, which reveal the change in ionization as the density of much of the ejecta decreases. The observed CO masses estimated from an LTE model are typically 0.0001 Msun during days 124 - 205, but could be an order of magnitude larger if non-LTE conditions are present in the emitting region. The timing of the appearance of CO is remarkably consistent with chemically controlled dust models of Sarangi & Cherchneff.

[포 IM-05] Kinematic Study of Northern Filament in Orion Molecular Clouds Complex By ^{12}CO Radio Observation

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Orion Molecular Clouds Complex(OMC) 분자운에는 별 생성은 없으면서 은하면 방향으로 누워있는 큰 규모(10° x 0.5°)의 필라멘트 구조가 있다. 본 연구는 북쪽 필라멘트(이하 NF)를 대상으로 12CO (J = 1-0) 선 관측 데이터를 이용하여 필라멘트의 운동학적 연구를 수행함으로서 은하면과의 상관관계를 알아보고자 하였다. 관측은 공간분해능은 2 arcmin인 SRAO(Seoul Radio Astronomy Observatory)의 6m 밀리미터 망원경이 사용되었고 큰 규모로 인해 은하면으로부터 먼 순서로 NF1, NF2, NF3 세 곳으로 관측 지역이 정해졌다. 연구결과 필라멘트는 매우 낮은 수준의 12CO (J = 2-1)과 티끌 분포에서 자기장을 따라 은하면 방향으로 연계되어 보였다. 밀도 분포에서는 SRAO 12CO (J = 1-0) 적분강도와 Planck 위성의 12CO (J = 2-1)과 티끌 자료를 이용했을 때, 12CO와 성간 티끌은 주로 은하면에 수직인 방향에서 밀도가 높았다. 속도 분포와 위치 속도 분석을 통해 NF는 단일 구조의 분자운 형태이고 NF2 하단에서는 회전 운동의 가능성이 확인되었다. NF3는 자기장에 의해 생성된 나선형 회전을 하고 있으며, NF2와 NF3를 따라 은하면을 향하여 12CO (J = 1-0)를 비롯한 물질이 흐르고 있음도 확인되었다. 하지만 은하면을 향하여 물질이 흐르는 원인을 제공하는 천체가 무엇인지와 NF1과 NF2 상단의 회전 운동은 확인 할 수 없었으며 이들 지역에 대한 상세한 관측이 요구된다.

외부은하/은하단

[포 GC-01] Dust Radiative Transfer Model of Spectral Energy Distributions in Clumpy, Galactic Environments

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The shape of a galaxy's spectral energy distribution ranging from ultraviolet (UV) to infrared (IR) wavelengths provides crucial information about the underlying stellar populations, metal contents, and star-formation history. Therefore, analysis of the SED is the main means through which astronomers study distant galaxies. However, interstellar dust absorbs and scatters UV and optical light, re-emitting the absorbed energy in the mid-IR and Far-IR. I present the updated 3D Monte-Carlo radaitive transfer code MoCafe to compute the radiative transfer of stellar, dust emission through a dusty medium. The code calculates the emission expected from dust not only in pure thermal equilibrium state but also in non-thermal equilibrium state. The stochastic heating of very small dust grains and/or PAHs is calculated by solving the transition probability matrix equation between different vibrational, internal energy states. The calculation of stochastic heating is computationally expensive. A pilot study of radiative transfer models of SEDs in clumpy (turbulent), galactic environments, which has been successfully used to understand the Calzetti attenuation curves in Seon & Draine (2016), is also presented.

[포 GC-02] Comparison of the extraplanar Hα and UV emissions in the halos of nearby