서의 분자운과 수소전리영역의 상호관련, 활동지역과의 접촉에 의한 분자함량의 변화, 공간속도 구조와 밀도분포등에 대한 연구를 하였다.

전체분자운의 구조는 밀도가 매우 높은 중심부가 수소전리영역과 접촉하고 있는 것으로 나타나며 그 외의 지역은 북동방향으로 확장되면서 많은 덩어리구조를 보이고 있다.

이 접촉지역의 고밀도 중심부의 분자함량은 일반적인 "warm molecular cloud"들과 비슷하나 별탄생지역이나 강한 충격파지역에서 매우 분자량이 증가하는 SO의 경우는 10배 이상 증가된 것으로 나타나 수소전리영역의 활동에 영향을 받고 있는 것으로 짐작된다. OCS, SO_2, HNCO의 분자함량은 상한값 만을 얻었다.

CO OBSERVATIONS OF BARNARD 34

Hyun Goo Kim[1,2], Seung Soo Hong[2], and Chul Han Kim[2]
[1]Division of Radio Astronomy, Korea Astronomy Observatory
[2]Department of Astronomy, Seoul National University

With the Nagoya 4 m radio telescope, a Bok globule Barnard 34 was observed in the CO(J=1→0)emission. An extended area, 40 arcmin x 54 arcmin in right ascension and declination, was mapped at intervals of two arc minutes, and in the ^{12}CO emission only a cross-cut scan was made over 50 arcmin in RA and 60 arcmin in Dec. The resulting map of ^{13}CO integrated intensity delineates two large clumps, whose line-of-sight velocities differ from each other by 1.2 km/s. Each of the two clumps comprises again two to three smaller clumps. All these sub-structures of the globule form a long filamentary distribution, running from north-east to south-west. The globule morphology seen from the radio map is quite different from its optical image in the POSS print.

If the globule is located at distance 200pc, with the estimated LTE mass we conclude that the two clumps move too fast to form a bound system. There are three IRAS point sources in the region. Analysis of the IRAS fluxes at 60 and 100 m and of the IRAS energy spectra of the three sources suggests that the one at the center of northern clump is at an early stage of protostar and the other two near the clump boundaries at fairly evolved stages.

Multiwavelength Study of the Protostellar Object IRAS 19550+3248

Bon-Chul Koo[1], G.A.Fuller[2], Youngung Lee[3], Myung-Gyoon Lee[4],
Suk-Minn Kwon[5], and Jae-Hun Jung[6]
[1]Department of Astronomy, Seoul National University
[2]Center for Astrophysics
[3]Five College Radio Astronomy Observatory

[4]The Observatories of the Carnegie Institution of Washington
[5]Department of Science Education, Kangwon University
[6]Daeduk Radio Astronomy Observatory, KAO

We carried out radio, near-infrared, and optical observations of an IRAS point source IRAS 19550+3248. The source is located at the center of a small(4′ x 7′)molecular clump, which is at the end of a long(~1°)filamentary molecular cloud. ^{12}CO J=1-0 line observations revealed high-velocity(HV) molecular outflow centered at IRAS 19550+3248. The HV gas has a bipolar pattern with the blue and red peaks separated by 1′ along the north-south direction. The mechanical luminosity of the HV molecular outflow is ~6 x $10^{31}d_2$ erg s-1 , and its dynamical age is ~ 5 x 10^4d_2 yr, where d_2 is the distance to the source normalized by 2kpc.

Inside the 95% confidence ellipse of IRAS position, we detected a point source with nebulosity in K band(see figure), which might be the protostellar object that drives the HV molecular outflow. The nebulosity extends to $0.1d_2$ pc (without beam deconvolution) in the east-west direction. The infrared source has a steep spectral index between 2 and 25 μm(n $\equiv d\log(\nu F_\nu)/d\log\nu = -0.93$), which is typical for a protostar deeply embedded in a molecular cloud core. The bolometric luminosity based on R, I, H, and K band photometry together with IRAS data is $150d_2^2$ $L_\odot$. Similar to other HV molecula out flow sources, the radiation force of IRAS 19550+3248 is considerably, by a factor of $10d_2^{-1}$, smaller than the required mechanical force. In R and I bands, we detected two bright sources located close to the peak position in K band (see figure). We discuss the implications of our results on the physical environment near the protostellar object.

Excitation of CO Molecules in Clumpy Interstellar Clouds

Yong-Sun Park[1,2], Seung Soo Hong[2], and Hong Sik Yun[2]
[1]Daeduk Radio Astronomy Observatory, Korea Astronomical Observatory
[2]Department of Astronomy, Seoul National University

To investigate how clumpy structure of interstellar clouds affects the excitation conditions of CO molecules, we generalized the one dimensional Monte Carlo code, originally developed by Bernes(1979), to a three dimensional one. Test was made of our 3D code by reproducing all the 1D results of Bernes, who had recovered the results of Leung and Liszt(1976) by applying his 1D Monte Carlo code to the spherical cloud completely filled with matter.

A sphrical volume was first divided into $4\pi/3x7^3$ cubic cells of equal size, and then some of the cells were filled with gas while others being kept empty, thereby simulating the