results imply that five events should be also associated with flares which were not observed because they occurred from back-side. This fact suggests a sufficient possibility that all solar proton events are related with both flares and CMEs. Finally we discuss how to predict back-side solar proton events.

■ Session : 별탄생 (SF)
4월 29일(수) 09:00 - 10:15 제3발표장

[SF-01] Kinematics of H2O Masers in Massive Star-forming Region W51M

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The W51M region contains numerous strong H2O maser sources, which are associated with outflows from massive proto-stars. The purpose of our research is to study the kinematics of maser spots in W51M as a probe to the site of multiple star formation and to contribute to the understanding of massive star formation. The distance measurement of W51M with annual parallax will be also possible as a prospect. For this study, we have acquired data sets of VLBI observations at 22 GHz with Japanese VERA (VLBI Exploration in Radio Astrometry) telescopes from 2003 to 2006. We are now proceeding with the imaging analysis for astrometric solutions, which will be the measure of internal kinematics in W51M. In this paper, we report the result from single-beam imaging data of an epoch previously not analyzed. Our results on W51M kinematics will be discussed and compared with the preliminary one reported by Kan-Ya et al. (2007).

[SF-02] Discovery of a VeLLO in the ``Starless'' Dense Core L328

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We report the discovery of a Very Low Luminosity Object (VeLLO) in the ``starless'' dense core L328, using the Spitzer Space Telescope and ground based observations from near-infrared to millimeter wavelengths.

The Spitzer 8 mm image indicates that L328 consists of three subcores of which the smallest one may harbor a source, L328-IRS while twoother subcores remain starless. L328-IRS is a Class 0 protostar according to its bolometric temperature (44 K) and the high fraction (~72 %) of its luminosity emitted at sub-millimeter wavelengths. Its inferred ``internal luminosity'' (0.04 - 0.06 L⊙) using a radiative transfer model under the most plausible assumption of its distance as 200 pc is much fainter than for a typical protostar, and even fainter than other VeLLOs studied previously. Note, however, that its inferred luminosity may be uncertain by a factor of 2-3 if we consider two extreme values of the distance of L328-IRS (125 or 310 pc).
Low angular resolution observations of CO do not show any clear evidence of a molecular outflow activity. But broad line widths toward L328, and Spitzer and near-infrared images showing nebulosity possibly tracing an outflow cavity, strongly suggest the existence of outflow activity. Provided that an envelope of at most ~0.1 M⊙ is the only mass accretion reservoir for L328-IRS, and the star formation efficiency is close to the canonical value ~30%, and L328-IRS has not yet accreted more than~0.05 M⊙, at the assumed distance of 200 pc, L328-IRS is destined to be a brown dwarf.

[SF-03] Dynamical Timescale inferred from Chemical Distribution in TMC-1

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We present a study of a low-mass star-forming region, Taurus Molecular Cloud-1 (TMC-1), with Spitzer Space Telescope (infrared), MAMBO at IRAM 30m Telescope (dust continuum), FCRAO 14m Telescope (CS (J=2-1) and N2H+ (J=1-0)), and SRAO 6m telescope (C17O (J=2-1) and C18O (J=2-1)). The cold, dark cloud TMC-1 ridge is an ideal source for studying chemical evolution before star formation occurs. According to previous molecular line studies, the cyanopolyyne peak (southeast part of TMC-1) is chemically younger than the ammonia peak (northwest part) due to its lower density. However, in our study, the column density calculated from dust continuum emission, the best tracer of density, is similar at the cyanopolyyne peak and ammonia peak suggesting that the difference in density in two peaks does not cause the differentiation of chemical distributions. The cyanopolyyne peak shows smaller CO depletion compared to the ammonia peak supporting the fact that cyanopolyyne peak is chemically younger. Therefore, we suggest that the differentiated chemical distribution is explained not by difference of density but by dynamical timescale to reach the same density.