

Activity Report of the NAOJ Visiting Scholar Program

Host Project/Division: NAOJ Chile Observatory Name of Host Scientist: Seichi Sakamoto

Name of Visiting Scholar: James Chibueze

Title: Visiting Professor, Visiting Associate Professor, Visiting Research Fellow

(Choose the appropriate one)

Period: from 2016/04/01 to 2016/06/30

I. Report from the visiting scholar

[i] Achievement during the period of stay (in comparison with the initial plan)

(Collaborative Research)

We explored the implication of the association (or lack of it) of 6.7 GHz class II methanol (CH₃OH) masers with massive dense cores (MDCs) detected (within a sample of ATLASGAL selected infrared quiet massive clumps) at 0.9 mm with Atacama Large Millimeter/submillimeter array. We found 42 out of the 112 cores (37.5%) detected with the Atacama Compact Array (ACA) to be associated with 6.7 GHz CH₃OH masers. The lowest mass core with CH₃OH maser association is ~12 Ms. The angular offsets of the ACA cores from the 6.7 GHz CH₃OH maser peak positions range from 0.17 to 4.79, with a median value of 2.19. We found a weak correlation between the 0.9 mm continuum (MDCs) peak fluxes and the peak fluxes of their associated methanol multibeam (MMB) 6.7GHz CH₃OH masers. About 90% of the cores associated with 6.7GHz CH₃OH masers have masses of >40 Ms. The CH₃OH maser containing cores are candidates for embedded high-mass protostellar objects in their earliest evolutionary stages. With our ACA 0.9 continuum data compared with the MMB 6.7 GHz CH₃OH maser survey, we have constrained the cores already housing massive protostars based on their association with the radiatively pumped 6.7 GHz CH₃OH masers.

We also carried out ALMA-VLBI (KaVA) synergetic study of G357.97-0.16 massive protostar. This involved comparing the results of multi-epoch KaVA observations of the water masers with the ALMA 12m and ACA results of G357.97-0.16.

(Education)

(Others)

[ii] Any comments on this program
The program was a golden opportunity to focus exclusively on research with ALMA archival data.
[iii] List of publications and presentations by the visiting scholar in collaboration with NAOJ staff or graduate students
<ul style="list-style-type: none"> • Chibueze, James O.; Csengeri, Timea; Tatematsu, Ken'ichi; Hasegawa, Tetsuo; Iguchi, Satoru; Alhassan, Jibrin A.; Higuchi, Aya E.; Bontemps, Sylvain; Menten, Karl M.; "Class II 6.7 GHz Methanol Maser Association with Young Massive Cores Revealed by ALMA", ApJ, 836, 59, 2017 • James O. Chibueze, Timea Csengeri, Ken'ichi Tatematsu, Tetsuo Hasegawa, Kazuhito Motogi, "G357.97–0.16: ALMA and KaVA View of a High-mass Protostar", presented at the ALMA 5-Year conference, Palm Springs, California.

II. 以下の項目について、受入教員が記入してください。

Report from the host scientist

[iv] 本制度に対する意見、要望など
Any comments on this program
There is no comment.