

# Activity Report of the NAOJ Visiting Scholar Program

Host Project/Division: Division of Theoretical Astronomy Name of Host Scientist: Masaomi Tanaka

Name of Visiting Scholar: Michael Richmond

Title: Visiting Professor

(Choose the appropriate one)

Period: from 17/04/01 to 17/05/30

## I. Report from the visiting scholar

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

#### (Collaborative Research)

I have worked on a transient search using the dataset from the new, wide-field and fast-readout CMOS camera (Tomo-e) on the 1.05m Kiso Schmidt telescope, in collaboration with Masaomi Tanaka. This dataset records images of the sky with 2 Hz sampling (every 0.5 seconds) and thus enables us, for the first time, to explore the transient sky at timescales shorter than a few seconds. For this purpose, I have developed a dedicated pipeline for data reduction and transient search, and evaluated the performance of this software. I have searched for short-timescale transients in data taken on 8 nights in 2016. The accumulated data correspond to a control time of 257,441 sq.deg.-seconds for 15 mag depth, which is by far the largest for data taken at 2 Hz. We found no genuine transients, and this gives an upper limit for areal rate of 0.3 per sq.deg. per day, which excludes the presence of short-duration flashes with absolute magnitudes of -30 for supernovae. A paper to present these results is now in preparation.

#### (Education)

I gave an intensive lecture course on Cosmic distance ladder at Sokendai. In 8 classes over 4 days (2017 May 22, 23, 29, and 30), I described various methods to measure the distances to astronomical sources, ranging from parallax to Type Ia supernovae. I presented the strengths and weaknesses of each method, including recent developments with new instruments. I let students to compute distances in class so that they understand the increasing uncertainties in measurements with increasing distance. All the course material is available online at <http://spiff.rit.edu/classes/ladder/ladder.html>

#### (Others)

None.

### [ ii ] Any comments on this program

I thoroughly enjoyed my visit to NAOJ. Professor Tanaka and his colleagues welcomed me to their weekly meetings and informal discussions. Inoue-san provided fantastic support for the course I taught, giving basic advice, making printouts of material for each class, and even coming into class to take photographs of an activity. The students were so attentive and engaged that each day was fun for me (though a lot of work!). The provided office space was a bit cramped. Your library is excellent!

[ iii ] List of publications and presentations by the visiting scholar in collaboration with NAOJ staff or graduate students

None.

(one paper in preparation)

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

招聘に関する事務手続きをしっかりとサポートして頂き大変助かりました。

客員教員の居室スペースが非常に狭いため、申し訳なくなってしまうます。もう少し良い部屋を用意できると良いと思います。