

Name of research institute or organization:

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**Institute of Physics, University of Tsukuba**

Title of project:

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Experimental operations of the Antarctic 30-cm submillimeter-wave telescope

Project leader and team:

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Dr. Masumichi Seta, project leader  
Dr. Makoto Nagai, Prof. Naomasa Nakai

Project description:

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Dome F on Antarctic is an excellent site for submillimeter-wave and far-infrared astronomy on the Earth. To establish astronomical activity on the site, it is the best way to develop a small telescope which is not only easy to set up but also able to bring us astronomical data of great significance. We have developed a submillimeter-wave telescope, the Antarctic 30-cm submillimeter-wave telescope.

We made experimental operations of the Antarctic 30-cm submillimeter-wave telescope in Jungfrauoch in February 2009 to check feasibility of astronomical observations with the telescope in low temperature and high altitude. We achieved the following:

- The telescope was moved and assembled successfully by 4 persons.
- The control system of the telescope worked fine.
- Errors of optical pointing was reduced below 16" rms.
- The temperature of instruments was controlled well to operate.
- A large noise from the motor drivers was identified.

After the experimental operations, we have reduced the noise from the motor drivers. Another experimental operations were made in Atacama, Chile in November, and we keep on working with the telescope to operate it in Dome F until 2012.

Key words:

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Radio astronomy, Submillimeter-wave telescope, Astrophysics, the Galaxy

Internet data bases:

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<http://www.px.tsukuba.ac.jp/home/astro/nakai/www0/index.html>

Collaborating partners/networks:

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National Astronomical Observatory of Japan, Tohoku University, Nagoya University, National Institute of Polar Research

Scientific publications and public outreach 2009:

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**Conference papers**

Seta, M., S. Ishii, M. Nagai, N. Nakai, Y. Miyamoto, the Antarctic 30-cm telescope group, H. Maezawa, and Antarctic Astronomy Consortium, Astronomy from Antarctic, workshop entitled "Nobeyama Radio Observatory in the past quarter century and future of radio astronomy", Tokyo, Japan, 3-4 July 2009, National Astronomical Observatory of Japan, 2009.

Seta, M., S. Ishii, M. Nagai, N. Nakai, Y. Miyamoto, the Antarctic 30-cm telescope group, H. Maezawa, and Antarctic Astronomy Consortium, Status report of the Antarctic 30-cm Submillimeter-wave Telescope, Nobeyama Radio Observatory User's Meeting, Nagano, Japan, 23-24 July 2009, Nobeyama Radio Observatory, 2009.

Ishii, S., M. Seta, M. Nagai, N. Nakai, Y. Miyamoto, H. Arai, H. Maehashi, T. Ishizaki, T. Nagasaki, H. Maezawa, and Antarctic Astronomy Consortium, Development of the Antarctic 30-cm Submillimeter-wave Telescope III, Proc. Meeting of ASJ in autumn 2009, Yamaguchi, Japan, 16 September 2009, the Astronomical Society of Japan, V76b, 2009.

Arai, H., M. Seta, N. Nakai, K. Hagiwara, Y. Miyamoto, M. Nagai, and S. Ishii, Development and Evaluation of a water cooling system for the wide-band digital spectrometer with AC240, Proc. Meeting of ASJ in autumn 2009, Yamaguchi, Japan, 16 September 2009, the Astronomical Society of Japan, V77b, 2009.

### **Theses**

Arai, H., Stabilization of a Wide-band Digital Spectrometer, Master Thesis, University of Tsukuba, 2009.

Ishizaki, T., Development of the Optical Pointing Method for the Antarctic 30-cm submillimeter-wave telescope, Bachelor Thesis, University of Tsukuba, 2009.

Nakano, M., Performance Evaluation the Optics of the Antarctic 30-cm submillimeter-wave telescope, Bachelor Thesis, University of Tsukuba, 2009.

### **Magazine and Newspapers articles**

“Aim to build an astronomical observatory in Antarctica”, The Shinano Mainichi Shimbun, November 23, 2009.

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