

Project No.:17004
 Core Institution in Japan: Nagoya University

JSPS Core-to-Core Program -Strategic Research Networks-
 FY2009 Research Report

Project No.	17004
Research Theme	Center for advanced research on the interstellar medium in sub-mm waves and gamma rays
Duration of Project	April 1, 2007 – March 31, 2010
Core Institution in Japan	Nagoya University

Implementing Organizations

Country	Japan
Core Institution	Nagoya University
Co-Chair (name and title)	Yasuo Fukui
Number of Cooperating Institutions	5
Cooperating Institutions	National Observatory of Japan, University of Tokyo, Kyoto University, Osaka Prefecture University, Hokkaido University

Country	Germany
Core Institution	University of Cologne
Co-Chair (name and title)	Juergen Stutzki, Professor
Number of Cooperating Institutions	1
Cooperating Institutions	University of Bonn
Matching Fund	University of Cologne: the Ministry of Research in the Federal State of Nordrhein-Westfalen, Operation of the KOSMA / NANTEN2 - observatories

Country	United States
Core Institution	Stanford University
Co-Chair (name and title)	Tsuneyoshi Kamae, Professor
Number of Cooperating Institutions	0
Cooperating Institutions	
Matching Fund	Stanford University, GLAST-Large Area Telescope

Country	France
Core Institution	CESR
Co-Chair (name and title)	Jean-Philippe Bernard, Researcher
Number of Cooperating Institutions	4
Cooperating Institutions	IAS, CEA/Saclay, LERMA/Paris, Strasbourg Observatory
Matching Fund	CNES/CNSR, PILOT, Fermi, Herschel, Planck, SPICA-ESI project funds

Country	Australia
Core Institution	University of New South Wales
Co-Chair (name and title)	Michael Burton, Professor
Number of Cooperating Institutions	2
Cooperating Institutions	University of Sydney, Macquarie University
Matching Fund	Australian Research Council, Linkage Infrastructure Equipment & Facilities: A ground station for the NANTEN2 sub-millimetre wave telescope

Country	UK
Core Institution	Cardiff University
Co-Chair (name and title)	Anthony Whitworth, Professor
Number of Cooperating Institutions	0
Cooperating Institutions	
Matching Fund	1. UK's Particle Physics and Astronomy Research Council, Rolling Grant: Unveiling the Hidden Universe 2. Framework Programme 6 of the European Commission, Research Training Network: Constellation

Result of Program Implementation

The projects have been progressed under the collaboration among the core institutions. We have also developed our collaboration with Japanese researchers majoring in the interstellar matter at National Astronomical Observatory in Japan, University of Kyoto, University of Tokyo, Hokkaido University, and Osaka Prefecture University to investigate the promotion of the research in the interstellar matter.

The keys to the joint research activities are; 1. Operation of sub-mm telescope NANTEN2 in Chile, 2. Comparative study of molecular data with gamma-ray data, 3. Statistical study of dust emission in molecular clouds, and 4. Theoretical Physics of Interstellar Medium with innovative observations.

NANTEN2 meeting was carried out at Kyodai Kaikan in Kyoto. The number of participants was 11 including Japanese, Germany and Australian researchers with a participant from Chile via TV. Status of the multibeam system and Nagoya 230GHz system is discussed and confirmed and checked the progress necessary for the publications. Observational results with NANTEN2 were reported and the future collaborative works and scientific programs were discussed.

Researchers were sent to various international conferences to present the scientific results by this core-to-core program, related to the ALMA, AGILE, Herschel, and Fermi projects as well as ISM, and Galactic center.

Achievements in FY2009 (Self Review)

The development of NANTEN2 progressed well, leading to successful sub millimeter observations. The observed targets include Galactic star forming regions, the Galactic center, the Large/Small Magellanic Clouds and others. Data reduction of the results from the previous years has been carried out, and the results were presented at various international workshop, journals, as well as master or doctoral theses. Infrared data by Spitzer and molecular/atomic data were precisely compared by Japanese and French partners, and the results was published also under a collaboration with SAGE group.

The study of interstellar matter has been progressed greatly both by utilizing the mm data and gamma-ray data. Not only the gamma-ray data by EGRET as we planned at the beginning of the project but also the data by H.E.S.S. has been also studied. The Fermi data started to be obtained. The Fermi data as well as H.E.S.S. is not yet openly available, but our collaboration makes it possible to start comparing the molecular data with these gamma-ray data. Our NANTEN and NANTEN2 data has been used carefully and restored so that the study to compare with the data in the other wavelengths is on going.

Winter school on the ISM was carried out from February 22 to 26 in 2010 with 51 participants including lectures and young researchers, respectively. The lecture covered observations with multiwavelength and also theoretical models. The discussion between the lecturers and young researchers was promoted, and the poster session was organized with short oral presentations for young researchers.