

Hiroshi IMAI

Integrated Arts and Science Area of the Research and Education Assembly

Kagoshima University

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(as of 27 October 2019)

Research Interests:

- Radio astronomy, especially using the interferometric techniques including very long baseline interferometry (VLBI).
- Astrophysical masers (mainly OH, H₂O, and SiO lines) associated with young stellar objects at the earliest stage of star formation process and with evolved stars such as long period variables including Mira and semi-regular variables in the asymptotic giant branch (AGB) and post-AGB phases especially that exhibit collimated, fast bipolar stellar jets or asymmetric planetary nebulae.
- VLBI astrometry yielding measurement of kilo-parsec scale trigonometric parallax distances as well as systematic secular and internal motions of maser sources, enabling to explore the star formation process and stellar evolution with energetic mass loss, and to trace the birth place and the origin of the maser sources in the Milky Way Galaxy.
- Development of automatic pipelines for VLBI data calibration and image cube synthesis, which works on the Astronomical Image Processing System (AIPS) using ParselTongue/Python scripts in the data analyses mainly for the VLBI Exploration of Radio Astrometry (VERA).
- Promotion of scientific large projects such as those with the combined array of the Korean VLBI Network (KVN) and VERA (KaVA), RadioAstron (Russian space VLBI project), the East Asia VLBI Network (EAVN), the Square Kilometre Array (SKA), and the Australian SKA Pathfinder (ASKAP).

Education:

- **Ph.D. in Science (major in Astronomy)** *Tohoku University* 1999 March *Tohoku University*
Dissertation: Internal Motions and Fine Structures of Astronomical Masers
— Application to Stellar Astrophysics and High Precision Astrometry —
Supervisors:
Prof. Munezo Seki, Prof. Tetsuo Sasao (National Astronomical Observatory of Japan)
- **Master's Degree in Science (major in Astronomy)** 1996 March
Tohoku University
Dissertation: Study on Massive-Star Formation Process Based on VLBI Observations of Water Maser Sources

Supervisors:

Prof. Mine Takeuti, Prof. Tetsuo Sasao (National Astronomical Observatory of Japan)

- Bachelor of Science (major in Astronomy) 1994 March
Theme: Very Long Baseline Interferometry in Astronomy
Supervisor: Prof. Mine Takeuti

Academic Appointments and Positions:

- **Associate Professor** Kagoshima University 2008 March — present
Center for General Education, Institute for Comprehensive Education and Amanogawa Galaxy Astronomy Research Center, Graduate School of Science and Engineering Works on astronomical supervision of bachelor and graduate (Ph.D. and master course) students in the study of astrophysical masers.
- **Visiting Associate Professor** 2012 April — 2013 March
International Center for Radio Astronomy Research
(Researcher of the "Strategic Young Researcher Overseas Visits Program for Accelerating Brain Circulation" in JSPS)
Promoting the Science Study Phase activity of the Galactic Australia SKA Pathfinder Spectral Line Survey (GASKAP) project.
- **Visiting Astronomer** 2016 January – March and 2017 June–July
Square Kilometer Array Organisation
Secondment work on Japanese contributions to SKA promotion from scientific, technical, and industrial interests.
- **Guest Associate Professor** 2013 April — 2015 March
..... 2009 April – 2012 March and 2013 April — 2015 March
Mizusawa VLBI Observatory, NAOJ
Study on stellar masers using the wide-band VLBI system recently installed in VERA and planned on the basis of VLBI observations with KaVA.
- **Guest Associate Professor** 2009 April — 2012 March
Mizusawa VLBI Observatory, NAOJ
Study on VSOP-2 Science and development of the pipelines for automatic VLBI data analyses. Ultra wide-band VLBI observations for multiple maser lines are also explored.
- **Assistant Professor** 2003 September – 2008 February
Faculty of Science, Kagoshima University
Supporting astronomical education of bachelor and graduate (master course) students.
- **JIVE Support Scientist** 2002 April – 2003 August
Joint Institute of Very Long Baseline Interferometry in Europe (JIVE)
A post-doctoral fellow in charge of user support in observational data calibration for the European VLBI Network (EVN).
- **JSPS Post-doctoral Fellow (PD)** 1999 April – 2002 March
Mizusawa Astrogeodynamical Observatory, National Astronomical Observatory of Japan —
In major of maser physics, star formation, stellar mass loss, and high precision astrometry based on the very long baseline interferometry (VLBI) technique. Contributing to data analysis and scientific observation planning for the VLBI Exploration of Radio Astrometry (VERA) of the National Astronomical Observatory of Japan (NAOJ).

- **JSPS Doctoral Fellow (DC1)** 1996 April – 1999 March
Tohoku University
In major of maser physics, star formation and stellar mass loss based on VLBI technique using the Japanese VLBI Network (J-Net). Software development of scientific operation for the 10 m dish radio telescope at the Mizusawa Astrogeodynamical Observatory, NAOJ.

Publications:

- 32 refereed papers published or currently been in press as the first author,
- 7 papers published in Japanese as the first author,
- and 80 refereed papers published as one of the co-authors.

See in detail URL: <http://milkyway.sci.kagoshima-u.ac.jp/imai/HI-achievements.doc> .

Professional Affiliations and Activities:

Professional society membership

- Full member of the Astronomical Society of Japan (ASJ) since 1995
- The International Astronomical Union (IAU) since 2000
- The Union of Radio Science International (URSI) since 2001
- The SKA Japan Consortium since 2008
- The Japan Scientists' Association (JSA) since 2004
- The Cosmic Radio Consortinum in Japan since 1995
- The Japanese VLBI Consortium since 1995
- Councilor of the Cosmic Radio Consortinum in Japan 2007 April–2011 March
- Councilor of the Japanese VLBI Consortium 2006 April–2009 December
- A councilor of ASJ 1996 April–2000 March —item A vice-chief of the bureau in the Association of the Young Astronomers and Astrophysists in Japan .. 1997 September–1998 August

Working Group/ Committee Membership

- The VLBI Steering Committee in NAOJ Since 2016 August
- The Time Allocation Committee of Nobeyama Radio Observatory
..... 2014 August – 2016 July
- Japan ALMA Science Advisory Committee Since 2014 May
- Working Group of Pulsar Study in the International SKA Science Working Group
..... Since 2013 February
- Chairperson of the Science Working Group on Evolved Stars for the KaVA and EAVN
..... Since 2011 June
- Coordinator of the sub-Working Group on Astrometry in the SKA Japan Consortium
..... Since 2008
- Steering Committee of GASKAP Since 2009 February
- The Radio Astronomy Frequency Committee in Japan since 2005 July
- Science Organization Committee of the East Asia SKA Workshop 2013 and 2019
- Advisory Committee of the Radio Astronomy Division in NAOJ 2010 July–2012 June
- Local Organization Committee of the East Asia VLBI Network Workshop 2010, hosted by Kagoshima University 2010 April 22–25
- The VLBI Programming Committee in NAOJ since 2009 July
- The National Radio Astronomy Observatory (NRAO, in USA) Users Committee 2009 January – 2012 December

- Coordinator of the working group to plan the maser source study in the VSOP-2 Key Science ProgramFY2007–FY2010
- Organizer of the NAOJ Workshop on VLBA Science2008 September
- Science Organization Committee of the IAU Symposium 242: Astrophysical Masers and their Environments 2006 April–2007 March
- Coordinator of the working group to develop the data calibration schemes for VERA astrometry FY2004–FY2007
- Coordinator of the VERA Data Analysis Working Group FY1999–2001
- Principal Investigator of the Nobeyama Long-term SiO Maser Survey Project 2000 April–2002 November

Referee

- Proposals of ATNF (Australia Telescope National Facility).
- Proposals of ALMA (as a reviewer).
- Proposals of the UK's e-MERLIN (Multi-Element Radio Link Network).
- Proposals of the 45-m dish telescope of Nobeyama Radio Observatory.
- Proposals of the 10-m dish telescope of the Atacama Submillimeter Telescope Experiment (ASTE).
- Proposals of VERA and KaVA.
- Proposals of NRAO's Very Long Baseline Array (VLBA) and the Very Large Array (VLA).
- Proposals of ATNF, ALMA, MERLIN, Nobeyama 45 m, ASTE, VERA/KaVA, VLBA/VLA
- 19 papers of the refereed astronomical journals.

Grants:

- Grant-in-aid of the Japan Society for the Promotion of Science (JSPS) and MEXT (KAKENHI) (Project code: 16H02167, JPY 46,670,000) FY2016–2019
for developing the triple-band receiving systems in Nobeyama 45 m telescope.
- JSPS Invitation Program for Research in Japan (for Dr. Willem Baan) 2016
February–April 2014–2018
for four researchers including Dr. José Francisco Gómez and Prof. José Maria Torrelles
- KASI Commissioning Program (JPY 6,000,000) 2015–2017
for promoting KaVA Large Program.
- JSPS Bilateral Collaboration Program 2014 July–2016 June
for collaboration in ASKAP (GASKAP) and MWA, lead by Dr. Keitaro Takahashi
- JSPS Invitation Program for Research in Japan (for Dr. José Francisco Gómez) 2014
November–December
- JSPS Invitation Program for Research in Japan (for Dr. Andrey Sobolev) 2014
February–April
- KAKENHI (Project code: 70374155, JPN 2,900,000) FY2013–2015
for promoting GASKAP and L-band (1.6 GHz) VLBI astrometry
- JSPS Strategic Young Researcher Overseas Visits Program for Accelerating Brain Circulation
(granted for long stay in ICRAR) 2011 December–2014 March
- JSPS Bilateral Researcher Exchange Program (for visit to the University of Tasmania and
Australia Telescope National Facilities) 2012 November 4–25
- Grant of the Yamada Science Foundation for the Promotion of the Natural Science (JPN
1,000,000) 2011 October–2013 March
- Grant-in-aid of JSPS for Foreign Post-doctoral Fellow (Dr. Daniel Tafoya, Project code:
22-00022, JPN 1,900,000)
..... FY2010–2011
- Grant-in-aid for NAOJ guest associate professor (JPN 500,000/year) FY2009–2011, FY2013
- KAKENHI (Project code: 20540234, JPN 3,300,000) FY2008–2010
- KAKENHI (Project code: 18740109, JPN 1,900,000) FY2006–2007
- JSPS Grant for Attendance to International Conferences: For IAU Symposium 234 .. 2006
April 3–7
- Grant of Sachio Hayakawa Foundation for Young Astronomers:
For attendance in IAU Symposium 203 2001 November 25–30
- Grant of Sachio Hayakawa Foundation for Young Astronomers: For attendance in
the Workshop for Astronomical Molecules, held in the Netherlands ... 2004 February 18–20

Teaching/Supervising Experiences:

- Supervisor of a JSPS foreign post-doctoral fellow FY2010
- Supervisor of a KAKENHI research assistant FY2016–2019

- Supervisor of four Ph.D. program students, including Mr. Gabor Oroszsince FY2009
- Lecture courses on mathematics, physics, information science, observational astronomy, scientific English, and radio interferometrysince FY2003
in the Gradual School of Science and Engineering/Faculty of Science
- Lecture courses on academic and research skillsFY2018
in the Center for General Education, Institute for Comprehensive Education
- Guest supervisor of a master course student in the University of Hong Kong since
2009–2011
- Supervisor of 6 master course students since FY2008
- Supervisor of 17 bachelor students since FY2008
- Invited lectures in senior high school1–2 lectures every year since FY2005
- Vice-supervisors of bachelor and master course studentssince FY2003
- Advanced lecture of radio interferometry in the Graduate School since FY2015
- Advanced lecture of observational astronomy in the Graduate School since FY2008–FY2014
- Lecture of Scientific EnglishFY2013–2016
- Lecture of Fundamental Physicssince FY2013
- Practice of fundamental calculation in space sciencesince FY2010
- Lecture of space scienceFY2006–FY2009, FY2013–present
- In charge of the class of fresh students admitted in FY2009
- Lecture of information literacyFY2006–FY2011
- Lecture of C-language FY2004–FY2011
- Practice of fundamental experiments in physics FY2004–FY2011
- Practice of public outreach FY2004–FY2009
- Practice of astronomical experiments FY2003–FY2011
- Tutor of the practice for VLBI data analysis in Korea 2005 April
- Tutor of the JIVE Summer Studentship 2003 June–August
- Tutor of the Radio Interferometry Summer School in Nobeyama 2000 August, 2001 August

Management Experiences:

- The Chair of the Committee of faculty development FY2019

- The Committee of Admission in the Faculty of ScienceFY2015
- The Committee of Public Outreach in the Faculty of Science . FY2006–2007, FY2013–2014
- The Committee of International Exchange in the University FY2013
- The Committee of the Resarch-Educational Program Promotion ...FY2008–2009, FY2011, FY2014
- Chair of the Committee of Students' Life in the Faculty of ScienceFY2009, FY2016
- Vice-chair of the Committee of Students' LifeFY2008
- The Committee of Students' Life in the UniversityFY2008–FY2009, FY2011
- The Committee of the Education Affair in the Faculty of Science FY2009, FY2011,FY2014
- The Committee of the Education Affair in the Graduate School of Science and EngineeringFY2008, FY2014
- The Committee of the Trafic Management in the Faculty of ScienceFY2004–FY2005

Public Outreach Experiences:

- Publich outreach events organized by the International Centre for Radio Astronomy ResearchFY2012
- Coordinator of the annual open house of the 6-m dish telescope operation facility in Kagoshima CityFY2007–FY2011, FY2014–2015
- The annual open house of the Kagoshima/Iriki Astronomical Observatory ...since FY2004
- Publich outreach events organized by the Youth Association in Kagoshima City FY2005–2009
- Science Partnership Program with senior high schoolsFY2007–2009
- Open house of NAOJ at Mizusawa, Mitaka, and Nobeyama FY1995–2001

Scientific and Technical Skills:

- Computer Programming: excellent at FORTRAN, Python, and BASIC, good at Visual Basic and C-language.
- Astronomical Data Analysis: excellent at Astronomical Image Processing System (AIPS), including construction of POPS RUN and ParselTongue scripts for VLBI data analysis.
- Good at CASA, NewStar (for single-dish radio telescope data of Nobeyama Radio Observatory), and *miriad*.
- Operation of the 10 m telescope of Mizusawa VLBI Observatory, the VERA 20 m telescope (including some experiences of telescope maintenance), and the 45 m telescope including the VLBI backend system.