

DEREK Y. KUBO

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EDUCATION: University of Washington, Seattle, Washington, Bachelor of Science in Electrical Engineering - August 1984

WORK EXPERIENCE: Design & development of RF & microwave systems, see <https://derekkubo.com> for further details

Academia Sinica, Institute of Astronomy & Astrophysics, Hawaii Operations	February 2002 to Present
Chief Engineer, RCUH Grade E30 Greenland Telescope Project Jan-2013 to May-2013, Jul-2016 to present	System/Hardware Engineer for electronics and fiber optics systems for a new telescope that was recently deployed in Thule AB, Greenland. Developed and maintain master system block diagram of RF and electronics hardware, designed custom RF instruments including: low phase noise LO Tx and Rx units; Built-In-Test-Equipment to provide remote data acquisition of numerous critical signals and parameters; and low temperature fiber optics system. Identify, evaluate and order critical COTS devices/components. Lead the design and deployment of second LO reference and down converter assemblies. Identified, ordered, inventoried and shipped critical COTS equipment and components to Thule. Supported the installation, test and troubleshooting of above hardware at Thule AB. Provided detailed budget, schedule, staffing requirements, documentation, trade studies, design reviews and status to management and science team. Supervise and mentor 3 technical staff members.
Chief Engineer, RCUH Grade E30 Yuan-Tseh Lee Array Project Jan-2013 to Jun-2016	System/Hardware Engineer for digital correlator upgrade to replace existing wideband analog correlator. Developed system architecture for new digital correlator utilizing I/Q downconversion for digitization of any 4 GHz portion of the existing 2-18 GHz IF band. Supervised and lead technical staff during assembly/test of custom hardware in labs and integration onsite. Provide detailed budget, Gantt schedule, staffing requirements, documentation, trade studies and design reviews to management and science team. Supervise and mentor 5 technical staff members.
Sr. Microwave Engineer, RCUH Grade E29 Smithsonian Submillimeter Array Project Nov-2010 to Dec-2012, continuation at ~10% level to present	Responsible Design Engineer for Block Down Converter for wideband correlator upgrade which accepts 16 sets of 8-12 GHz IF inputs and provides amplitude leveling, filtering and downconversion to DC-2 GHz baseband channels prior to digitization. Also involved with system level activities including: generation of ICDs, reviewing designs, cost studies, and coordinating activities between ASIAA and SMA. Supervise and mentor 3 technical staff members.
Sr. Microwave Engineer, RCUH Grade E29 Atacama Large Millimeter Array Project Sep-2010 to Aug-2011	Responsible Design Engineer for LO Reference Test Module instrument used to characterize the ALMA receivers at the East Asia Front End Integration Center. This instrument utilizes a pair of lithium niobate Mach-Zehnder modulators to generate 3 spectrally pure optical tones whose differences represent the desired LO and Test Signal over a range of 27-122 GHz. This instrument is still in use to test the development of the ALMA Band-1 receivers.
Sr. Microwave Engineer, RCUH Grade E29 Atacama Large Millimeter Array Project Jan-2009 to Sep-2010	Responsible Design Engineer for Alternate Laser Synthesizer engineering model to generate a master LO for 66 antennas at a remote interferometry radio telescope located in Chile. This instrument utilizes a lithium niobate Mach-Zehnder modulator to generate a pair of spectrally pure optical tones whose difference frequency represents the desired LO over a range of 27 – 122 GHz. This technology is currently being applied to the AMiBA project to generate calibration signals in the 86-102 GHz frequency range.
Sr. Microwave Engineer, RCUH Grade E29 Smithsonian Submillimeter Array Project Jun-2004 to Jan-2009	Provide maintenance support and design upgrades to IF/LO system for Submillimeter Array telescope on Mauna Kea. Specific tasks: onsite trouble-shooting and repair of microwave equipment; design enhancements for performance and reliability improvements; support astronomical observations. Support and maintain documentation.

Development of a Mach-Zehnder Modulator Photonic Local Oscillator Source, 1st author, IEEE Transactions on Microwave Theory and Techniques, Vol. 61, No. 8, August 2013

Academia Sinica, Institute of Astronomy & Astrophysics, Hawaii Operations	February 2002 to Present (continued)
Sr. Microwave Engineer, RCUH Grade E29 Array for Microwave Background Anisotropy Project Feb-2002 to Jun-2004	Responsible for the design and development of a wideband 2-18 GHz analog correlator system ² for 13-element interferometry array. Specific tasks: architectural trade study & final design of a system expandable to 13-elements; component specification and testing; parts and subcontract procurement; detailed electrical and mechanical design of modules and assemblies; fabrication, final assembly and test. Intensive involvement with 2-element prototype engineering tests on Mauna Loa. Provided detailed budget, schedule, staffing requirements and design reviews to management and science team.
Technical Consultant	December 2000 to January 2002
Northrop Grumman Corporation, Redondo Beach, California Dec-2000 to Jan-2002 (low level follow-up work to 2010)	Supported activities for High Speed Modem group: <u>Onsite tasks:</u> Supported a variety of testing, alignment and troubleshooting of modem hardware at Redondo Beach facility including: 2400 Msps 16QAM receiver; 1600 Msps MSK receiver; 900 Msps 8PSK receiver. Also supported terrestrial air link tests at Westford, MA, facility. <u>Design tasks:</u> 2400 MHz Clock Recovery VXI plug-in module; Baseband Processing VXI plug-in module; both for new 16QAM receiver product line. Integration and test of the module was performed onsite. <u>Documentation tasks:</u> CPM Replacement Trade Study, Receiver Troubleshooting Guide, 8PSK Receiver Alignment and Acceptance Test Procedures; Specification for Cross Polarization Canceller unit.
Academia Sinica, Institute of Astronomy & Astrophysics, Hilo Hawaii June to August 2001	<u>Design tasks:</u> Down Converter unit (redesign), Noise Source unit, both for Smithsonian Submillimeter Array telescope. <u>Onsite tasks:</u> Installation, test, and troubleshooting of IF/LO hardware, Mauna Kea, Hawaii. <u>Documentation tasks:</u> IF/LO System functional diagrams, installation and test procedures.
Smithsonian Submillimeter Array, Hilo Hawaii	August 1999 to October 2000
Microwave Engineer, Grade GS-13 Step 4 1999 to 2000	Installed 13 Equipto racks in shielded correlator room at Mauna Kea in accordance to architectural assembly drawings. Populated racks with custom equipment delivered from Cambridge, MA, route/install cables, test system on astronomical sources. Pull single and multimode fiber optic cables through underground conduit to antenna pads, fusion splice Glenair connectors. Integrate IF/LO hardware into antenna cabins and provide functional tests. Supported science commissioning of telescope.
TRW Space & Electronics Group Redondo Beach, California	May 1989 to October 1998
Department Staff Engineer, Grade 11 Subproject Manager – Satellite Receiver System 1997 to 1998	Managed the development of a 900 Msps 8PSK satellite receiver system. Included the development of 8PSK receiver, test modulator, adaptive equalizer, and cross polarization canceller units. Specific tasks: technical oversight of individual unit RDEs; generating detailed schedules, budgets, and staff requirements; briefings to upper management.
Department Staff Engineer, Grade 11 Responsible Design Engineer – 900 Msps 8PSK Receiver Product 1995 to 1997	Oversaw the detailed design of a 900 Msps 8PSK receiver using pre-established module designs. Implemented several design improvements to accommodate stringent 8PSK BER requirements and to lower recurring costs. Specific tasks: overall unit architectural development; oversee individual module and board designs; unit specification.

² A Wideband Analog Correlator System for AMiBA, 2nd author, Proc. SPIE, Millimeter and Submillimeter Detectors for Astronomy II, 455 (October 8, 2004); doi:10.1117/12.550993

TRW Space & Electronics Group Redondo Beach, California		May 1989 to October 1998 (continued)	
Member of Technical Staff, Senior Link Test Bed Engineer – 1600 Msps Modem Test Bed 1993 to 1995		Integrated 1600 Msps prototype receiver with MSK/QPSK modulators, TWT amplifier, adaptive equalizer, cross polarization canceller. Specific tasks included the optimization and characterization of BER and carrier acquisition levels through various sets of link distortions. Provided numerous demos to both internal and external customers.	
Member of Technical Staff, Senior Design Engineer – Development of 1600 Msps Prototype SQPSK/MSK Receiver 1991 to 1993		Member of small development team – developed architecture and key circuit designs for future 1600 Msps class of modulators and demodulators. Intensive involvement with breadboard designs, optimization of BER and clock and carrier recovery circuitry. My specific designs included: Kt-band MMIC front end; detection filter/decision circuit board; ADC board; clock divider board; output clock/data line driver board; and SQPSK modulator unit. Supported onsite installation and deployment of modem hardware at remote ground station facility.	
Member of Technical Staff, Level II Test Set Manager – Flight Payload Test Set 1990 to 1991		Integrated several racks of custom digital and microwave equipment to support testing of satellite communication system. Aligned and tested overall test set according to formal acceptance test procedure.	
Member of Technical Staff, Level II Responsible Design Engineer – Down Converter Unit 1989 to 1990		Designed unit for down conversion of satellite signal for payload test set. Unit also provided noise injection for characterization of BER. Specific tasks: generation of specifications and test procedures; electrical design, overseeing of mechanical design, fabrication and assembly; alignment and test.	
NEC America – Mobile Radio Division, Hawthorne, California		September 1988 to May 1989	
Cell Site Maintenance Engineer 1988 to 1989		Maintenance and support of NEC cellular radio base stations located throughout the US. Included onsite troubleshooting, cell site expansion support, and organization of repair facility.	
Boeing Aerospace – Ballistic System Div. Kent Space Center, Washington		October 1984 to August 1988	
System Engineer – Launch Support Systems, Vandenburg Air Force Base 1986 to 1988		Design upgrades for existing communication links for Minuteman Missile Launch Support System. Existing system utilized pressurized coaxial cables for radio telemetry and twisted pair cables for control and status. My specific task involved the redesign utilizing fiber optics and T1 microwave for telemetry and control & status, respectively.	
Design Engineer – JTIDS Radio Development Program, Navel Ocean System Center 1984 to 1986		Member of design team to develop environment simulator for JTIDS radio. My specific tasks included the design of microwave circuits for a down converter/ADC board and DAC/up converter board operating from 960-1215 MHz.	