Hamdi Mani

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Education

Arizona State University, Tempe, AZ
Bachelor of Science, Physics, December 2013

Professional/Research Experience

Engineer — ASU THz/Radio Astronomy Lab, Tempe, AZ, USA — January 2014- Present

Development of state of the art cryogenically cooled low noise amplifiers, ultra wideband circuits for radio astronomy and detector readout as well as low temperature physics experiments.Managed 3 research labs, including: procurement of parts and test equipment, helping PHd students and mentoring students of all levels. Designed cryogenic test systems for semiconductor and superconductor characterization. Provided 100s of cryogenic low noise amplifiers to collaborators.

Research Assistant — ASU THz/Radio Astronomy Lab, Tempe, AZ, USA — August 2010- December 2013

Worked with 3 scientists and on many projects related to Submm/THz Instrumentation, Low frequency Radio astronomy instruments, RF/Microwave Electronics, Detector Readout, Digital Signal Processing (DSP),Cryogenic and vacuum systems, Hardware and software projects

Research Technician — Caltech, Electrical Engineering, Pasadena, CA, USA — June 2005 - June 2010

I worked with Dr. Sander Weinreb of Caltech and JPL on designing, building, testing and deploying extremely sensitive Cryogenically cooled receivers for Radio Astronomy and deep space communication applications.

Skills

Design, assembly and testing of room temperature and cryogenically cooled RF/Microwave Low noise amplifiers (LNAs), including multi channel LNAs/Amplifiers.

Extensive experience with RF/Microwave Design tools: Cadence/AWR Microwave Office EDA software.

Printed circuit board (PCB) design for low frequency and RF application, in rigid and flexible substrates.

Packaging of RF microelectronics components in multi chip modules (MCMs) and MIC/Hybrid (chip and wire) packages, including micro-soldering and wirebond.

Experience with wire bonding machines from different manufacturers: WestBond, TPT, Hybond and Kulicke and Soffa. Thermosonic and Ultrasonic (wihtout heat) Wirebonding using gold and aluminum wire.

Extremely efficient at surface mount technology (SMT) soldering down to 0201 and 01005 size components using micro soldering equipment or hot air stations.

IPC J-STD certified soldering

Design and calibration of RF noise measurement setups at room and cryogenic temperatures, including: Calibaration of Solid State Noise sources and Design and operation of primary thermal noise generators.

Design of Vacuum/Cryogenic systems for electronics testing and for instruments deployment.Including UHV (Ultra High Vacuum) systems and vacuum systems with large windows for radio astronomy front-ends.

Experience with High frequency test equipment: Spectrum Analyzers, Vector Network Analyzers, high speed oscilloscopes, wafer probe stations, Digital Spectrometers... Including in setting automated testing station: Programming different pieces of test equipment using Python and SCPI language.

3D/2D mechanical design using CAD tools: Autodesk Inventor and Autocad

Mechanical skills: Some experience with milling machines as well as other machining/shop equipment (drill press, band saw, disc sander, shear, corner cutter, tube bender...)

Management Skills: Helped with setting up 3 research Labs at ASU, experience buying expensive highly specialized equipment, working and collaborating with people with different levels, mentoring young undergraduate and Phd students in the lab

Some Past Projects

GAVRT: Goldstone Apple Valley Radio Telescope: Designed, built and deployed 2 wide band receiver Front ends for a 34 meter Radio Telescope on the Mojave Desert in California. This work has been published in the peer reviewed literature (IEEE journals)

SUPERCAM: A 64 pixel heterodyne focal plane array operating on the 350GHz band: I was involved in packaging and testing a lot of the components of Front end of the 64 Pixel system at ASU and Caltech.

Development of flexible, multi channel, high frequency transmission lines for multi-channel room and cryogenic temperature applications.

ngVLA PROTOTYPE FRONT-END: Development of low power, compact front end for the ngVLA project (Next Generation Very large Array) :1-4GHz receiver with a 1.2Kw power consumption.

GUSTO: Development of an 8 Channel cryogenic low power LNA for the 0.3-4GHz band for a NASA long duration Balloon mission instrument (GUSTO)

GUSTO: Development of an 8-channel high gain/low power IF system and delivering NASA flight hardware compliant assemblies

Development of very high gain (90dB), low power (200mW) amplifier for IF systems of Heterodyne Terahertz receivers.

Development of SiGe Heterojunction bipolar transistor(HBT) Amplifiers

Development of room temperature L Band Low Noise Amplifiers as part of the technology development program for the Square Kilometer Array (SKA)

Design of a 32 channel highly reconfigurable test system to characterize the testing and calibration of the MWA (Murchison Widefield Array) analog beamformer.

Development of Solid State and thermal Noise generators to calibrate radio astronomy receivers

Development of the IF processing hardware and software for THz receivers

Development of antialiasing filters for high speed analog to digital converters

Development of a TRL calibration kit for vector network analyzer measurements

Provided room temperature and cryogenic LNAs (about 500 units) to many ground base and balloon borne instruments: BLAST (MKID detector array), MUSCAT (at the LMT) ,NIKA 2 Camera on IRAM telescope, GUSTO (Heterodyne THz, in progress) , Simons Observatory CMB instrument, HEAT instrument in Antarctica, GUSTO...

Publications on the Peer Reviewed Literature

A single-stage cryogenic LNA with low power consumption using a commercial SiGe HBT
11th Int. Low Temperature Electron. Workshop, Jul. 2014, pp. 1720
Hamdi Mani , Philip Mauskopf

A 16-channel flex circuit for cryogenic microwave signal transmission
Proceedings of SPIE - The International Society for Optical Engineering, 2014
Patrick McGarey, Hamdi Mani, Caleb Wheeler, Christopher Groppi

SuperCam: a 64 pixel heterodyne imaging spectrometer
Proc SPIE 08/2008
Christopher Groppi, Christopher Walker, Craig Kulesa, Dathon Golish, Jenna Kloosterman, Patrick Ptz, Sander Weinreb, Thomas Kuiper, Jacob Kooi, Glenn Jones, Joseph Bardin, Hamdi Mani

The Kilopixel Array Pathfinder Project (KAPPa), a 16 pixel integrated heterodyne focal plane array
Proc SPIE 09/2012
Christopher E. Groppi, Caleb H. Wheeler, Hamdi Mani, Patrick McGarey, Todd Veach, Sander Weinreb, Damon Russell, Jacob W. Kooi, Arthur W. Lichtenberger, Christopher K. Walker, Craig Kulesa

First observations with SuperCam and future plans
Proc SPIE 09/2012
Jenna Kloosterman, Tiara Cottam, Brandon Swift, David Lesser, Paul Schickling, Christopher Groppi, Michael Borden, Allison Towner, Per Schmidt, Craig Kulesa, Christian d'Aubigny, Christopher Walker, Dathon Golish, Sander Weinreb, Glenn Jones, Hamdi Mani, Jacob Kooi, Art Lichtenberger, Patrick Puetz, Gopal Narayanan

Matched wideband low-noise amplifiers for radio astronomy
Review of Scientific Instruments, Vol. 80, April 2009
Sander Weinreb, Joseph Bardin, Hamdi Mani, and Glenn Jones.

SiGe HBT X-Band LNAs for Ultra-Low-Noise Cryogenic Receivers
IEEE Microwave and Wireless Components, Vol. 18, No. 7, July 2008
T.K. Thrivikraman, J.Yuan, J.C. Bardin, Hamdi Mani, S.D. Phillips, W-M L. Kuo, J.D. Cressler and S. Weinreb

Design of SiGe Cryogenic Low-Noise Amplifiers
IEEE Transactions on Microwave Theory and Techniques, Vol. 55, pp.2306-2312, November 2007
S. Weinreb, J.C. Bardin, and Hamdi Mani

Design of a Wideband Radio Telescope
IEEE 2007 Aerospace Conference, Big Sky, MT. March 2007
William A. Imbriale, Sander Weinreb, and Hamdi Mani