



**Electronics and Electrical  
Engineering Laboratory, NIST**



**National Institute of Metrology,  
China**

**12 September 2007**

The excellent research programs and metrology capabilities that exist at NIM and NIST offer great opportunities for profitable cooperation and collaboration. Based upon recent communications and mutual visits, the Electronics and Electrical Engineering Laboratory (EEEL) of NIST and NIM intend to pursue the following joint efforts to promote programs at both institutions.

- NIST's EEEL intends to supply an advanced programmable quantum Josephson voltage standard (JVS) to NIM. This standard consists of a 5 volt array with a probe and NIST developed operational software. NIM expects to then purchase commercial microwave electronics. NIM plans to send two staff member to NIST (for at least 9 months total) to customize the operation of their system, to develop the bias electronics fitted to the system, and to contribute to NIST efforts related to quantum voltage ratio measurements.
- NIM and NIST's EEEL have jointly organized and will host the 2007 NIST-NIM Joint Metrology Workshop in China in September 2007.
- NIST's EEEL intends to send its compact Josephson voltage system to NIM sometime in 2008 to perform a comparison with NIM's interim Josephson voltage system. This is expected to validate the performance of the NIM dc voltage standard and improve NIST's capability to perform direct JVS-to-JVS comparisons.
- NIST's EEEL intend to calibrate the power standard that NIM will be using for an APMP key comparison for electric power. This comparison is expected to link the APMP comparison to the CCEM key comparison that NIST piloted several years ago.
- NIST's EEEL intends to collaborate with Professor Zhang on NIM's capabilities in ac resistance and EEEL's capabilities in digital signal processing to mutually improve our ac impedance capabilities.
- NIM and NIST's EEEL intend to perform an Excimer laser power/energy comparison at 193 nm and/or 248 nm. This is expected to involve NIM staff bringing NIM's transfer standard to Boulder to assist in measurements at NIST.

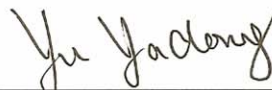
- NIM and NIST's EEEL intend to perform a Q-switched Nd:YAG (1.06 um) laser power/energy comparison. Again, NIM staff plan to bring NIM's transfer standard to Boulder to assist in measurements at NIST.
- NIST's EEEL and NIM expect to perform an optical fiber power comparison based upon the protocol developed for the recent comparison between NIST and METAS.
- NIM is very interested in flat panel display metrology. As a first step, EEEL intends to offer a complimentary slot for NIM at the display metrology workshop. NIST experts in this area will visit NIM in September 2007 to assist NIM in setting up their display metrology program.
- NIM is interested in the efforts of EEEL to design and build a new cryogenic radiometer. EEEL will keep in contact with NIM as this work progresses, and NIM may send a guest researcher to help with assembly and measurements of the new instrument.
- NIM plans to send a guest researcher to NIST for a 6-month visit starting in October 2007 to work with the EEEL Electromagnetics Division to develop capability related to microwave power.
- NIM is very interested in antenna measurements and field probe calibrations, and proposes to send a researcher to work with the EEEL Electromagnetics Division for 12-month visit starting in 2008 or 2009.
- To further improve the relationship, NIST's EEEL and NIM intend to further explore strengthening personnel exchanges for laboratory work or lectures.

This document is a statement of intent of the parties to collaborate and is not a legally binding document. No legal rights or responsibilities are created by the terms herein and all activities are subject to applicable national laws, including export controls. Activities contemplated by this document are subject to the availability of funds and other necessary resources to the parties. Neither party commits to obligating funds to the activities suggested herein.

Completion of these planned activities is expected to greatly advance some capabilities at NIM, and to vastly increase communications between NIST and NIM, and substantially contribute to advancing certain research programs at NIST.



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