

## PREFACE

The fields of frequency standards and frequency metrology have a special inter-connection to physics. Metrology and standards allow exacting measurements that explore the farthest reach of scientific models and theories. The most well known example is the atomic clock, which plays an important role in test of relativity, and gravitation. On the other hand, the same standards and metrological techniques depend on advances in various fields of physics to realize higher performance and capabilities. This duplex relationship has made frequency standards and metrology extremely rich. The International Symposium for Standards and Metrology has been organized for the past 37 years to provide a forum where researchers in diverse fields connected with frequency standards and frequency metrology gather to discuss the latest advances in the fields, and explore future directions.

I first learned about the International Symposium on Frequency Standards and Metrology (ISFSM) in 1980, shortly after I had switched research to work in the field of atomic frequency standards. This highly anticipated event was planned for 1981, and my supervisor, who had attended a previous symposium, was extremely excited. Despite my best efforts, I was too junior to secure a travel approval to Aussoi, but I wasn't too disappointed until after my supervisor returned and related all the stories about talks, people, and the cutting edge research that was discussed and disclosed in the symposium. Seven years later I finally had the opportunity to attend the 4th ISFSM in Ancona. I remember vividly, as I was then a relative newcomer to the field, how eager I was about the prospect of learning the latest information and meeting the experts and luminaries of the field. After attending the conference, I left Ancona with a great sense of energy, and was charged by all the latest information that the talks and many hours of one on one interaction with many experts attending the symposium provided. The meeting was key in motivating thoughts on how to expand our research at JPL, and how to connect with other fields related to frequency standards and metrology. After Ancona, I attended the other symposia in Woods Hole and St Andrews, both of

which extended and strengthened the already impressive experience of Ancona.

It was against this backdrop that when asked by Patrick Gill, the chair of the 6th Symposium, to organize the 7th Symposium, I was both excited about the opportunity, and keenly aware of the challenges to maintain the tradition of ISFSM in providing a venue and program that is faithful to its tradition and reputation.

The meeting that was held during October 6-9, 2008 in Asilomar Conference Center, Pacific Grove, California stayed faithful to the tradition of ISFSM in that 125 participants gathered to interact and discuss the latest developments in the field. Among the subjects that have developed new advances since the 6th symposium, optical lattice clocks, quantum controlled ion clock, and advanced trapped ion clocks stand out. Significant advances were also made in “traditional” clocks, such as cold atom fountains and microwave clocks. Clocks being developed for space applications have advanced significantly, as have miniature atomic clocks based on coherent population trapping (CTP). New and promising directions in optical combs and microwave oscillators based on miniature optical whispering gallery mode resonators were identified. The latest advances in gravity gradiometer, a close relative of the atomic clock, were discussed.

All in all, the symposium was a testament to the health of a field that is nearly as old as physics itself, and has its modern roots in the Harrison clock.

In organizing the conference, I began with assembling a team of extremely competent and dedicated people, and by seeking support from JPL, NIST and Aerospace Corp. The support that was generously extended by the three institutions allowed an early establishment of a web site, and selection of a venue that would be both serene and conducive to informal interaction amongst the participants. Asilomar is well known for its location on the Monterey peninsula, providing a pleasant environment and good food.

The program was organized with the generous help from a distinguished international steering committee, followed by many hours of help from the Local Organizing Committee. The arrangements to reserve Asilomar, and all the registration matters were competently performed by Synergistic Management, Inc. But the ingredient that pulled all these pieces together, while handling the trauma of working with a demanding conference chair was the conference secretary, Allyson Beatrice of OEwaves, Inc. Allyson began helping with the initial announcement for the conference and continued her support with registration, organization of the program, and collection of papers for these proceedings. The conference could simply not have been successful without her expert support and committed care for smoothing out all thorny issues that were encountered.

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