

“Sound of Music” Experience in Italy (1969)

Our whole family had a great experience when I was invited by Professor Sigfrido Leschiutta (https://it.wikipedia.org/wiki/Sigfrido_Leschiutta) to accept a "Visiting Professor Grant." We spent two months in Torino during the summer of 1969 helping IENGF (Istituto Elettrotecnico Nazionale Galileo Ferraris) with their time-scale, and doing some experiments, and giving some lectures.

Sigfrido had been a guest worker at NBS, and I had gotten to know him there, and I also had visited him in his laboratory (IENGF) in 1967 on my way to Ankara, Turkey, where my LF-VLF paper was to be given. He was a most gracious host, and I learned that he is a multi-talented man. I heard him sing with a music group; he has a great tenor voice. He built himself a harpsichord, and he knows the religious and cultural history of Italy extremely well. I learned a lot from him.

It took two cars to pick up my wife and me and our five children from Milano to drive to the lovely apartment Sigfrido had gotten for us in the quaint mountain village of Coazze – a 40-minute drive to the lab. I bought an Opel Record that would barely accommodate the seven members of our family and our luggage. This was my commuter vehicle to IENGF. We learned that there are no bad drivers in Italy; they are all dead! They are aggressive, but very good drivers. I'll never be the same after driving there for two months. Then there was no speed limit on the autostrada, and what an experience it was to drive there.

I had written the AT-1 time-scale algorithm for generating official time for NBS the previous year and I did the same for them using their computer operating system. I gave several lectures and Sigfrido prepared a book with the relevant papers that I had written to go along with those lectures – a most kind gesture and a benefit for the attendees.

The wonderful home Sigfrido provided for us in the mountains gave Edna and the children a great place to hike and pick blueberries and mushrooms. When I would come home in the evening, the children's mouths would be blue! Our trip was like a Sound of Music experience for us.

Sigfrido is one of finest people I have ever known. He did everything he could to make our stay be most enjoyable. One weekend he took us down to Florence, which is the cultural heart of Europe, and with all that is there it was an educational experience of a lifetime. The Museum of Science History in Florence, I believe is the best in the world; it is amazing as you see and feel the scientific method catching on. And then you have the Uffizi Museum, which is like the Louvre in Paris, and the Dome and all the other cathedrals; it was most inspiring.

On the way back, we climbed the Leaning Tower of Pisa. I did not know that the “Leaning Tower” is the bell tower for that cathedral where Galileo used his pulse to measure the period of the chandelier after it started swinging following the lighting of the candles and noticed the period was independent of amplitude – giving him the first shot at deriving Newton's laws of motion. In that cathedral they had a baptismal font where they baptized by immersion. On our drive back to Coazze, we got to drive through Genoa.

While in Italy, we spent our Saturdays visiting the gorgeous Alps in that vicinity. We went up to Gran Paradiso, and to Cervinia and climbed up a ways on Cervino, which is the Italian's name for the Matterhorn. These are both in Valle d'Aosta, which leads you up to the Monte Bianco (15,771 feet, F, Mont Blanc; Big White Mountain in English). There are 200 ski resorts on that mountain, and it is so popular that on average one person dies per day on that mountain from a huge variety of accidents. In September 1967, I was on my way to IENGF – having hiked up to a glacier in the rain because I was so intrigued by its size – and I drove into Chamonix during a dark and rainy night and checked into a hotel. When I awoke to clear skies and a foot of snow with Mount Blanc totally white, I was spellbound by the sight. It is so massive and beautiful. It was fun to learn that they have a teleferic system going from the French side to the Italian side. After driving through the 7.2 mile long tunnel, I had to take the teleferic up the Italian side and watch them skiing in new snow on the glacier in September; awesome site.

While we were in Italy, we got to watch the moon landing. This had special significance for me because I was a consultant for the Apollo program. NASA had a concern about the clock error as the craft would go into the shadow of the moon. They had to reacquire communications as soon as possible, and the flicker-noise of the quartz-crystal oscillators they were planning to use was a concern. Atomic clocks had not been developed for space at that time. So I was able to give them some guidance on optimal use of quartz-crystal clocks in the presence of flicker-noise time dispersion.

The lab folks gave us a big send-off party. Then the seven of us loaded up our little car to drive across the Alps. The family had a great time swimming in Lake Como, where we stayed the first night. I was so impressed with the glaciation, the mountain terrain, and how well managed the Swiss are in taking care of their resources – never over-grazing – a common problem in the states. We went to the Swiss Temple in Bern, and stayed overnight as we visited Grindelwald, where the view of the Eiger is breathtaking, and Lauterbrunnen, where we took the teleferic giving us one of the most incredible views in my life, and we saw a chamois on the way up – a rare treat.

I had arranged to visit Dieter Kirschner at AOA in Graz, who has the atomic clocks for Austria and does a great job with them. He kindly accommodated our whole family to stay the night. The next evening, we had a dinner engagement with the folks (Giovanni Busca and his team) at the Neuchatel Observatory, where they again kindly accommodated our family to spend the night. Official time for Switzerland was then broadcast by 75 kHz transmitter, HBG, and all train stations were tied to it. It was discontinued in 2011 and now all of Europe uses the German station DCF77 controlled by the PTB.

We then drove to the Paris Observatory to visit Bernard Guinot and his activities at the BIH. We then crossed the channel and went to the London Temple, where they also accommodated our family. We got to show our children London Bridge, Big Ben, Westminster Abbey, and the changing of the guard at Buckingham Palace. We dropped our car off at the London docks to be shipped to Houston, and flew home via Chicago, where we lost our oldest son, Sterling, at the airport, and through prayer found him. SCARRY. The whole trip was a cultural-life-changing experience for the whole family. All of us look back at it with the fondest of memories. THANK YOU, Sigfrido Leschuitta for inviting us.

INTERNATIONAL 1/F (flicker noise) SYMPOSIUM (1977)

In July 1977, I was invited to give a talk in Tokyo by Professor T. Musha of the Tokyo University on flicker-noise in atomic clocks (<https://tf.nist.gov/general/pdf/634.pdf>) at an international symposium. Our youngest, Nathan, was eleven months, and Edna decided she could wean him so she could go with me. Our oldest, Shelli, was very responsible, and we felt we could leave her to take care of the family while we accepted this invitation and enjoy a two-week travel package that would take us down to Kyoto on the bullet train; Kyoto was the former imperial capital for Japan. We got to visit Nara as well. This was a great cultural experience for us.

Professor Musha was a most kind host, and the conference was a very interesting one because of the ubiquitous nature of flicker-noise. I got to meet Dr. Richard Voss, who did the graphics for Benoit Mandelbrot's famous classic works on FRACTALS. Jim Barnes had invited Mandelbrot to the lab in Boulder to give a talk because of the self-similar nature of flicker-noise and fractals. Mandelbrot gave Jim a copy of his book, where he coined the word, and that is where I learned of Voss' contribution.

Voss' talk showed how $1/f$ spectral densities were observed in music, all kinds, except for the beat. While I was on the executive committee for the Frequency Control Symposium, we invited Voss to give a talk. He showed that by generating music with white noise, it would drive you crazy, and if you did it with random-walk, it put you to sleep, but if you did it with $1/f$ noise, it was pleasing to the ear!

Musha took me on the train to Nippon-electric, where they were making a cesium beam frequency standard. During our two-hour train ride, we had some interesting conversations about their culture, and he asked me the question, "Why have most of the major inventions been made in America?" I shared with him my perspective on the "Land of the free," and the importance of liberty to us – being motivational to arise to your full potential. He discussed their cultural problem that you cannot be promoted above your boss in Japan, or words to that effect. How well students do on exams determines their future; hence, the suicide rate is high for those who feel they have failed. At the same time, the Japanese diet makes them one of the healthiest nations. Fermented foods like natto are common for them, which Americans eat very little of. K2 deficiency in the American diet is one of the drivers for osteoporosis being epidemic here. Our diet is meat and dairy centered, while the Japanese is more rice and vegetables and seafood centered. If you look at our earth at night, the Japanese sea is the brightest spot on the planet as they use lights to fish by.

I was big into jogging at that time and came close to doing two miles in 12 minutes. In Boulder, I would jog around the one-mile loop of Paragon Drive and Empire Drive three times every morning. As I would enjoy the night sky, I figured out how to turn the big-dipper into a clock with which you could keep time anywhere in the northern hemisphere, as long as you knew the date and your longitude – not very practical, besides it rotates counter clockwise and is a sidereal clock! While we were in Tokyo, I remember feeling my resting heart rate beating so strong that it shook the bed at 38 beats per minute. Because we were close to the summer solstice and they were far north and east in their time zone, it got light before 5 a.m. So I would

get up and go jogging every morning exploring the fish market, the Emperor's Palace, etc. Jogging was a great way to see a city and to get a feel for the different parts of their culture and society. One morning I got lost, and it took me two hours to find my way back. Thank goodness for the Tokyo Tower.

When we got home, Shelli drove the entire family to meet us at the airport in a Datsun 500. Nathan grabbed his mother around the neck and wouldn't let go. Shelli had done a super job getting the kids to do their jobs so they could then go play. The home was immaculate when we got there. It was fun stuffing all nine of us and our luggage into that little Datsun. It was so great to see our family. Our family is our most precious possession, and how blessed we are with ours.