David V. Giri, Switzerland's HPEM Conveyor

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Abstract — Since the 1970's, the Swiss defense authorities became increasingly concerned about threats posed by Nuclear Electromagnetic Pulse (NEMP) and started to investigate the effects as well as protection methods against High-Power ElectroMagnetic (HPEM) sources. The Swiss EMP Group in the Lab Spiez met Dr. Dave Giri in 1985 on the occasion of an "EMP Interaction and Hardening" short course in Interlaken, Switzerland. This was the beginning of a fruitful and enduring cooperation with Dave. He had a close scientific and personal relationship with Dr. Carl Baum, who already then was a leading scientist in the HPEM community. Carl's theories and ideas and Dave's talent to make ideas work for Swiss protection needs formed a unique combination which contributed a lot to the HPEM community and to standardization.

Keywords - NEMP; HPEM; interaction; hardening; protection, standardization

I. YEARS OF VALUABLE COLLABORATION

From the beginning of our cooperation Dave Giri's talent to translate complex theory into understandable technical information was the key to lead Swiss research projects to success. In a pragmatic way Dave identified opportunities from discussions with research partners and helped to find ways simple enough for quick implementation.
As a neutral country and due to the lack of standards until the 1990's Switzerland had to evaluate and define its own protection requirements. These had to be realistic, yet still meet the limited budget of a small country. The requirements were based on theory and were verified by threat-level tests in our lab. Over the years many results were presented to an interested audience during HPEM conferences. This brought wide recognition and some results also contributed to international standardization.

II. EXAMPLES OF JOINT RESEARCH

Over the years Dave Giri supported many Swiss research projects, such as the investigation of the shielding effectiveness of cylinders and cubes made of rebar mesh by theoretical models and experiments, including time-domain tests using the Swiss MEMPS simulator. The immunity of electronic components was tested using Low Power Microwaves (LPM). The source was taken from a modified microwave oven with a parabolic antenna.
As the world's leading EMP-simulator designer Dave Giri also calculated the antennas of the Swiss EMP simulators. He was involved in the design of VERIFY, one of the fastest EMP-simulators, and in the VEPES modification.
In 1995 Dave Giri and Armin Kälin (then head of the Swiss EMP group) sketched the first HPEM spectrum [1] (Fig. 1) and presented it at AMEREM'96 in Albuquerque. Later the HPE-spectra were adapted for the IEC standards 61000-1-5 [2], 61000-2-13, 61000-4-35 and 61000-4-36.

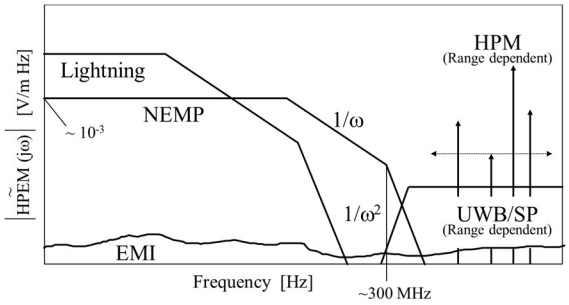

Figure 1. Initial version (1996) of HPEM-spectra [1].

Further collaboration with Dave includes the development of Swiss Impulse Radiating Antennas (SwIRA diameter 1800 mm and SwHIRA 1410 mm).
Typical Swiss civil protection shelters were assessed with respect to HPEM threats. In 2006 Dave designed oscillators for the generation of damped sinusoidal pulses. Armasuisse purchased 200 MHz and 500 MHz oscillators with output voltages up to 30kV. These are used as electromagnetic wave radiators in the Swiss Half IRA (SwHIRA) for the test of various objects.
In 2009 Dave designed and realized a 300 kV feed which permits to use the GTEM 3500 cell in pulsed mode.
These and more collaboration projects with Dave will be presented in more detail during the oral session.
Over the years Dave Giri shared a lot of ideas and experience with us. For us Dave is much more than a scientific mentor, he is a very good friend.

REFERENCES

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