



EMC Personality Profile

Frank Sabath, Associate Editor

Introducing Mats Bäckström

If one searches IEEE Xplore for articles on IEMI, reverberation chambers, or HPM, the name Mats Bäckström will be on the author list of top scores. Mats is a typical Nordic gentleman with a tall physic, blond hair, and blue eyes. He is characterized by his friendly personality. Every time I've asked him for comments, input, or assistance, I received his reply immediately.

When I asked Mats to provide a summary of his achievements, he mentioned that he had accomplished them in close collaboration with colleagues in Sweden and abroad. Every scientist knows that one man only seldom accomplishes achievements in the research and development area, particularly investigations that are based on experiments. In the case of Mats Bäckström, he was indebted not only to his colleagues at FOI and Saab, but also to other colleagues in Sweden and abroad. As a scientist as well as a gentleman it is important for him to mention his team and colleagues instead of claiming the appreciation for achievements only for himself.

Mats started his career as a student of physics and received his diploma (M.Sc.) in Engineering Physics in 1978 from the University of Uppsala, Sweden. Then he focused on the area of atomic and molecular physics. From December 1978 to December 1980, he held a fellowship at CERN, the European Organization for Nuclear Research in Geneva, Switzerland. During this time he worked mainly on problems related to beam transport.

While working on his Ph.D. thesis, Mats made his first experiments in high power electromagnetics. An important part of his work was to construct a radiation source based on a very fast electric discharge, together with an analysis of parameters in the discharge, such as the temperature. In 1985, he received the Ph.D. in Atomic and Molecular Physics from the University of Uppsala, Sweden for his the-



Mats Bäckström

sis titled "Experimental Studies of Atoms and Molecules by Soft X-ray and XUV Techniques."

For his first job after having received the Ph.D., Mats was with ASEA (now ABB), where he worked on the improvement of analytical and numerical models to predict flashover in insulation of large power transformers. The step into the EMC community started when he joined Saab Military Aircraft in early 1988 as the head of a group dealing with design and verification of aircraft protection against EM effects such as lightning, HEMP, and HIRF. The main part of his work was related to the fighter aircraft JAS39 Gripen, but some work concerned the civil commuter aircraft Saab 2000.

While Mats was with Saab, he and his colleagues worked on the applications and development of methodology for coupling analyses and immunity testing of aircraft. The work covered the whole chain from theoretical and numerical analyses via low-level coupling measurements to threat level testing. The work comprised most EM effects such as lightning, high altitude electromagnetic pulse (HEMP) and (HIRF). One important part of the

work was to improve the way to analyze shielding effectiveness (SE) of complex enclosures. Mats and his team found it was impractical to apply results of comparative MIL-STD 285 type measurements for the SE of gaskets to predict SE for a complex structure like an avionics bay. This led to a search for more efficient and better-defined methods to characterize the SE of apertures, such as a gasket. The Saab team concluded that the concept of an apertures transmission cross section was a more appropriate way to characterize the shielding properties of an aperture.

Between 1991 and 1994, Mats started his first change from industry to a government agency by spending one day a week as an adjoint research director at the Swedish Defense Research Agency FOI (then called FOA). In 1994, he finished this path by accepting a full time position as Research Director in Electromagnetic Effects at the Swedish Defense Research Agency FOI. In this position Mats became the project manager for most of FOI's projects on EM Effects and Protection.

At FOI, Mats continued working on the analysis of shielding effectiveness (SE). He and his team developed methods to measure and apply the transmission cross section for analysis and determination of shielding effectiveness. The need for the transmission cross section, which is an absolute measure of the transmission properties of an aperture, was motivated by the fact that the shielding effectiveness of an enclosure depends on both the transmission properties of the apertures and on properties of the cavity backing the apertures. The FOI team found that comparative, "hatch off", measures of the SE of e.g. a gasket does not, in general, give the information needed to predict the SE of an enclosure furnished with the gasket. Finally, the method using the transmission cross section is now

included as an annex in the IEC standard for reverberation chambers, IEC 61000-4-21.

Driven by the need for a test set up which enabled high power tests at a system level, Mats started investigations of reverberation chambers. In close cooperation with Gus Freyer and engineers at NIST in the US, the team performed extensive work on how to relate immunity testing in reverberation chambers with that in an anechoic chamber. The FOI team could experimentally confirm the fundamental role the directivity of the test object plays in relating the outcome of a test in the two test environments. In addition, Mats' team performed an extensive evaluation of the parameters that are of most importance in order to make a stirrer efficient, by use of goodness-of-fit tests of measured correlation coefficient. The result showed that the diameter of the stirrer is much more important than the height of the stirrer. The reverberation chamber related work at FOI was completed by statistically based evaluations of reverberation chambers, e.g. to detect an (unwanted) unstirred component.

In addition to his work on reverberation chambers, Mats is well known due to his investigations on high-power microwaves (HPM) and intentional electromagnetic interference (IEMI). Under his lead, FOI cooperated with other European government agencies to investigate the effect of HPM on complex systems. In later years, Mats was quite active within the field of IEMI. His team carried out several investigations on civilian systems, e.g. together with the other



Mats enjoying one of his favorite pastimes - a hiking tour.

Nordic countries. They have also been active participants in conferences and within the URSI and IEC organizations. Personally, he has been very active in spreading information on IEMI effects to relevant organizations and authorities in Sweden.


Mats is active in various IEC working groups on reverberation chambers, IEMI, and IEMI test facilities. He has been a member of the IEEE Electromagnetic Compatibility Society for decades and served as secretary of the IEEE Swedish EMC Chapter. Currently, he is Chairman of the Swedish URSI Commission E, Electromagnetic Noise and Interference, Co-chairman of the URSI working group on Intentional EMI (IEMI), and Swedish delegate to URSI commission E.

On the personal side, Mats is married to Kicki, who works as a cardiac nurse at the University hospital in

Linköping, and father of three grown-up children. His oldest daughter Åsa has a degree in economics from London Metropolitan University. His son Jonas is studying political science and economics at Lund University in Sweden. The youngest daughter, Tove, has just left home and is currently working in Dublin while considering what to do in the future.

Now, after all his children have left home, Mats fills his leisure time with reading. His interests span from novels, preferably by Swedish authors on history and philosophy, in particular ontology. Mats describes himself as not very sportive but he likes hiking in the mountains or in the forest. On sunny winter days, one can see him skating on one of the numerous lakes in the surroundings of Linköping. He also enjoys gardening work at home or at his cottage. EMC

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