

# My Journey with Carl



By D.V. Giri

4 July 2012

# Foreword

In this booklet I wish to document the highlights of my professional journey with Dr. Carl E. Baum, a relationship that lasted from 1972 until his untimely demise in 2010.

Carl once said “Everyone has a right to make a fool of himself” and I may be doing just that in writing and freely distributing this booklet. No matter: In my old age, I have come to realize the power of self-deprecating humor.

I began working with Carl as a National Research Council Post-Doctoral Fellow in August 1975 at Kirtland Air Force Base in New Mexico. Dr. Babu Singaraju (now at The Air Force Research Laboratory, Kirtland, AFB, NM) and Dr. Ken Chen (now at Sandia National Laboratories) had arrived at Kirtland before me.

ATLAS I (TRESTLE) was being planned and built and I was quickly initiated into Nuclear Electromagnetic Pulse (NEMP) Simulator analyses and design. Everything I had previously learned about transmission lines, waveguides and antennas was put to good use with Carl’s guidance.

Carl also asked me to teach at short courses and technical workshops offered in many countries around the world. There I got to know those European colleagues with whom I still work.

In 2009, during the last short course in Switzerland, in his charming, pompous way, that giant of a man “knighted” me. He gently placed a medieval sword upon my shoulder and said, “I want you to continue the tradition of the High-Power Electromagnetics short course and I want you to keep The Notes Series alive.”

That was well within his character. I fulfilled my promise to him by organizing a short course in Germany in September 2011 and I also assumed the position of chief editor of the Notes Series.

Carl was a “singularity” amongst his peers but also revered those he called his champions. This booklet documents my association with Carl and recognizes his place in the ranks of the best of the best.



*Requiescat in pace.*

D. V. Giri  
Alamo, California.



*“Many HEMP Simulators were built in Western Europe with Britain, France, Germany, The Netherlands, Sweden, Switzerland and Italy being the major ones. Besides my own involvement, great credit is due to D. V. Giri (my alter ego\*) for many of the detailed calculations, and working with U.S. pulser manufacturers.”*

— Dr. Carl E. Baum

*Reminiscences of High-Power Electromagnetics*

IEEE EMC Transactions, March 2007

— 50th Anniversary of IEEE EMC Society

### *A debt of gratitude*

Chuck Reuben ably served as Carl's assistant from 2005 to 2010 at the University of New Mexico. Chuck's magical touch with figures and text has transformed this into an elegant book. I am thankful for his invaluable help in preparing this book.

*Second Printing.*

*\*Alter ego* (Latin, “the other I”) can have a positive connotation (Superman and the mild-mannered newspaper reporter Clark Kent) or a negative one (Dr. Jekyll and Mr. Hyde). I like to believe that what Carl meant in the above quote is that we were functionally similar and that I helped bridge the gap between his ideas and the resultant HPEM systems and facilities in the United States of America and Western European nations.

D.V. GIRI

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# First Meeting

I met Carl Baum in 1972 when I was a graduate student at Harvard University, studying at the Gordon McKay Laboratory on Oxford Street, in Cambridge MA. I was working with Professor Ronald Wyeth Percival King, an iconic figure in Electromagnetics whose distinctive British name envisaged the glory of the British Empire.

I was killing myself in degrees, both literally and figuratively, and I only came to realize the underlying implication of the confluence of such iconic figures and place names much later.

Top educational institutions in India had given me a solid foundation in physics, mathematics and electrical engineering and Crimson Professors King and T.T. Wu had taught me how to “think.” But the Harvard of the 1970s did not like the term “engineering,” a discipline that concerns itself with the application of the physical sciences.

As it turned out, my background and training in physics, mathematics and applied physics became useful when Carl visited the Gordon McKay Laboratory and introduced me to applied electromagnetics. In retrospect, my journey with Carl was a natural progression from a solid foundation of theory to application via thought processes.

When I first met Carl, he said “Come to work with me when you graduate.” It was neither a request, nor a suggestion: I had the option of continuing at Harvard as a post-doctoral Fellow *or* I could come to Albuquerque to work with him.

Three years later I decided to come to the Duke City and thus began my 35-year working relationship with Carl Baum. I have enjoyed this journey but I have no clue what my career would have been like, had I not landed in Albuquerque in the summer of 1975.

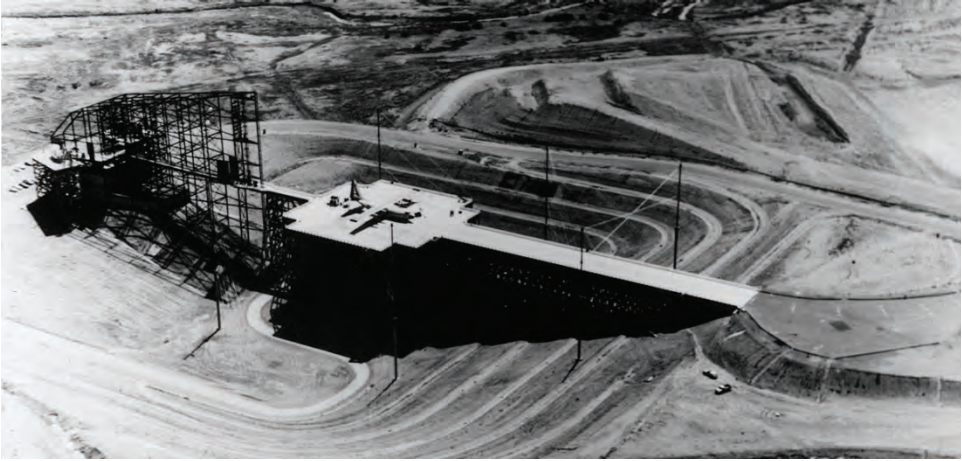




# Collaborative Works

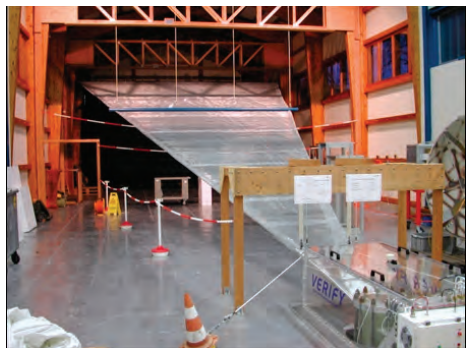
**M**y work with Carl dealt with areas of Nuclear Electromagnetic Pulse (NEMP) simulation, the design of radiating systems for high-power microwave (HPM) systems and the development of hyperband antenna systems (UWB to some).

## NEMP Simulators



**World's largest NEMP Simulator – ATLAS I (TRESTLE)  
built in mid 1970s (~ 10 ns rise)**

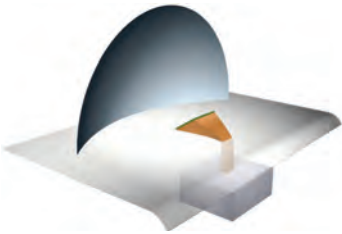
Three types of Nuclear Electromagnetic Pulse simulators appeared during the 1960s and 1970s when the early NEMP facilities were being built: They were the guided wave, the radiating type and the hybrid that combines some aspects of both radiating and the guided wave types of simulators.



*I was fortunate to learn the design principles of all three types of NEMP simulators from Carl and I have implemented them in the USA and Western European nations.*

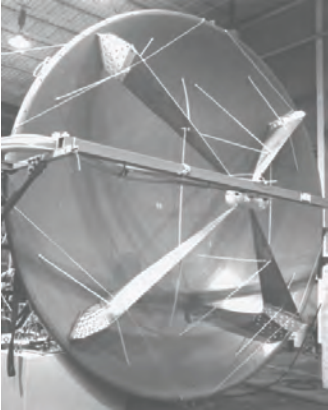
## MY JOURNEY WITH CARL

**M**any of these simulators, owing to their large sizes, posed unique engineering problems. We solved these problems in both quality and cost-effective ways. Carl asked me to work with high-voltage engineers, pulsed power engineers and program managers and we efficaciously brought several projects to fruition. Afterwards, I assumed responsibility for the design and optimization of major NEMP simulators in the U.S., Italy, Sweden, Switzerland, Germany and Israel where I collaborated with colleagues in governmental organizations that represented various nations.



**High-Power Microwave (HPM) Antennas:** Carl guided me through the design of radiation systems for HPM weapon systems. This pioneering work won me a BEST PAPER Award from the SUMMA Foundation, presented at the 1992 Joint Symposium of IEEE Antennas and Propagation Society, URSI Radio Science and NEM Meeting. Carl suggested

that I collaborate with Prof. Clay Taylor and publish a book on HPM. This SUMMA book was published by Taylor and Francis International Publishers, Washington, D.C. The research was sponsored by U.S. Army Research Laboratory, Adelphi, MD.



**Prototype IRA — circa 1994**

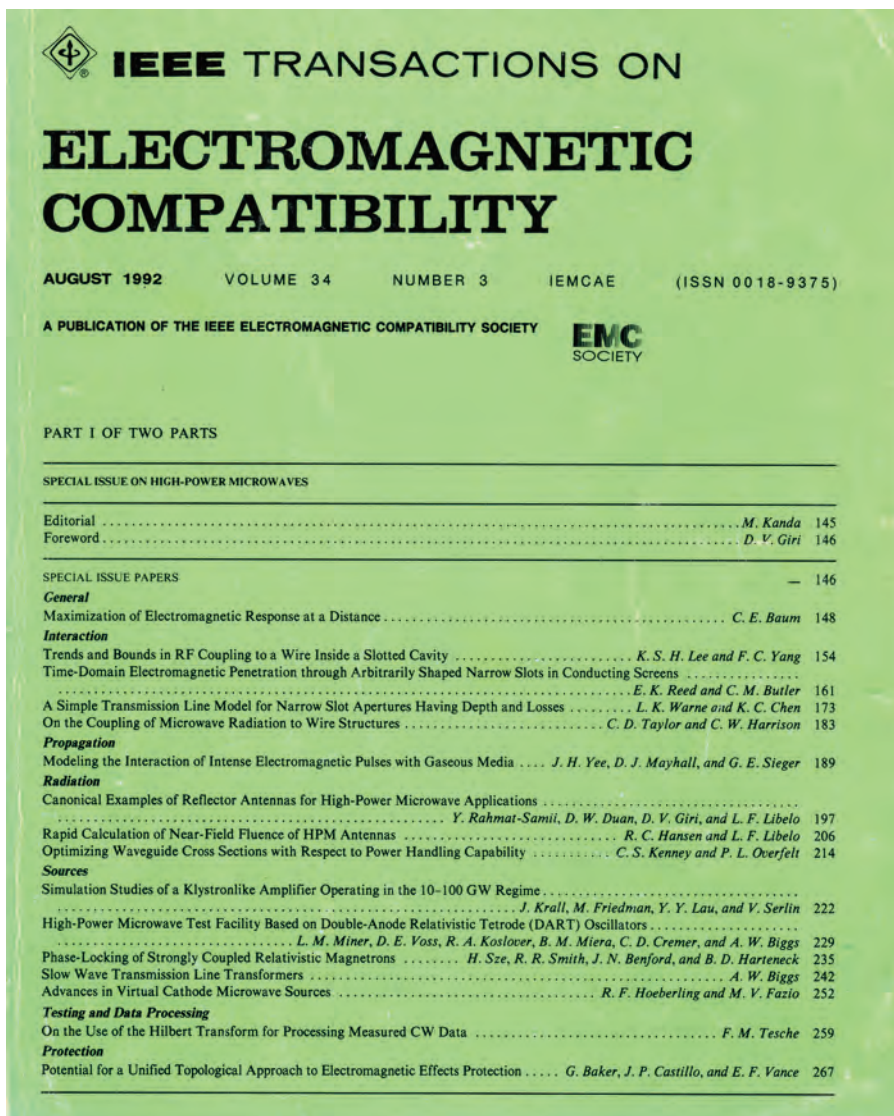


**JOLT (Half IRA) — circa 1999**

**Hyperband Systems:** Carl wrote a concept paper on radiating impulse-like waveforms (100's of ps wide) in 1989. He helped me to implement the concept that resulted, in 1994, of a highly successful Prototype IRA. This work was sponsored under SBIR Phase I and II contract awards from the Air Force Research Laboratory, Kirtland AFB, NM. Since completing that pioneering work, many UWB systems that I and others have built are finding applications in military and civilian sectors.

D.V. GIRI

*IEEE Transactions on Electromagnetic Compatibility*  
**Special Issue on High-Power Microwaves**



The image shows the cover of the IEEE Transactions on Electromagnetic Compatibility journal. The cover is green and features the IEEE logo at the top left. The title "IEEE TRANSACTIONS ON ELECTROMAGNETIC COMPATIBILITY" is prominently displayed in the center. Below the title, the issue information is provided: "AUGUST 1992", "VOLUME 34", "NUMBER 3", "IEMCAE", and "(ISSN 0018-9375)". The cover also mentions "A PUBLICATION OF THE IEEE ELECTROMAGNETIC COMPATIBILITY SOCIETY" and the "EMC SOCIETY" logo. The table of contents is listed below, including the special issue on high-power microwaves.

**IEEE TRANSACTIONS ON  
ELECTROMAGNETIC  
COMPATIBILITY**

**AUGUST 1992**    **VOLUME 34**    **NUMBER 3**    **IEMCAE**    **(ISSN 0018-9375)**

A PUBLICATION OF THE IEEE ELECTROMAGNETIC COMPATIBILITY SOCIETY    **EMC SOCIETY**

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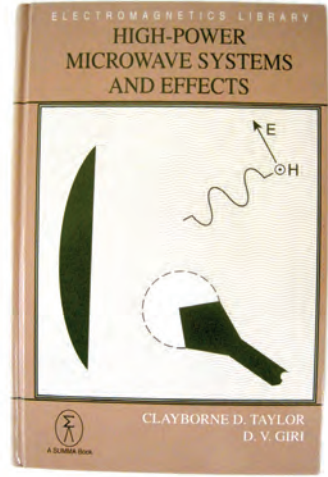
*Carl assisted me when I served as the Guest Editor of a Special Issue on High-Power Microwaves for the IEEE Transactions on Electromagnetic Compatibility in August, 1992.*



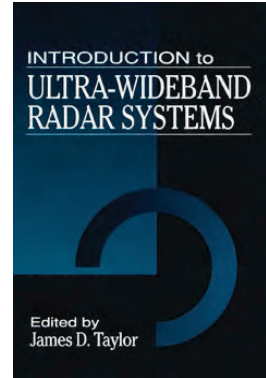
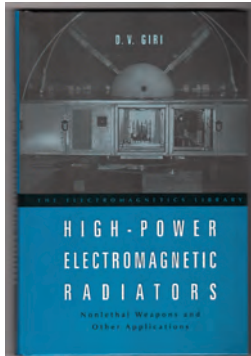
Carl also helped me with  
my own books and  
book chapters . . .

*Acknowledged with Gratitude!*

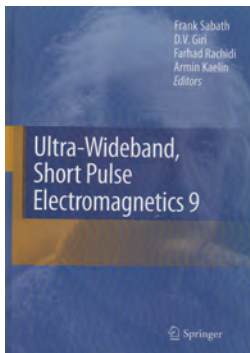
*C. D. Taylor & D. V. Giri*  
**HPM SYSTEMS and EFFECTS**  
A Summa Book edited by C. E. Baum  
Taylor & Francis Publisher, 1994



HPEM Radiators  
**Nonlethal  
Weapons  
and Other  
Applications**  
by *D. V. Giri*;  
Electromagnetics  
Series  
Harvard  
University Press;  
August 2004



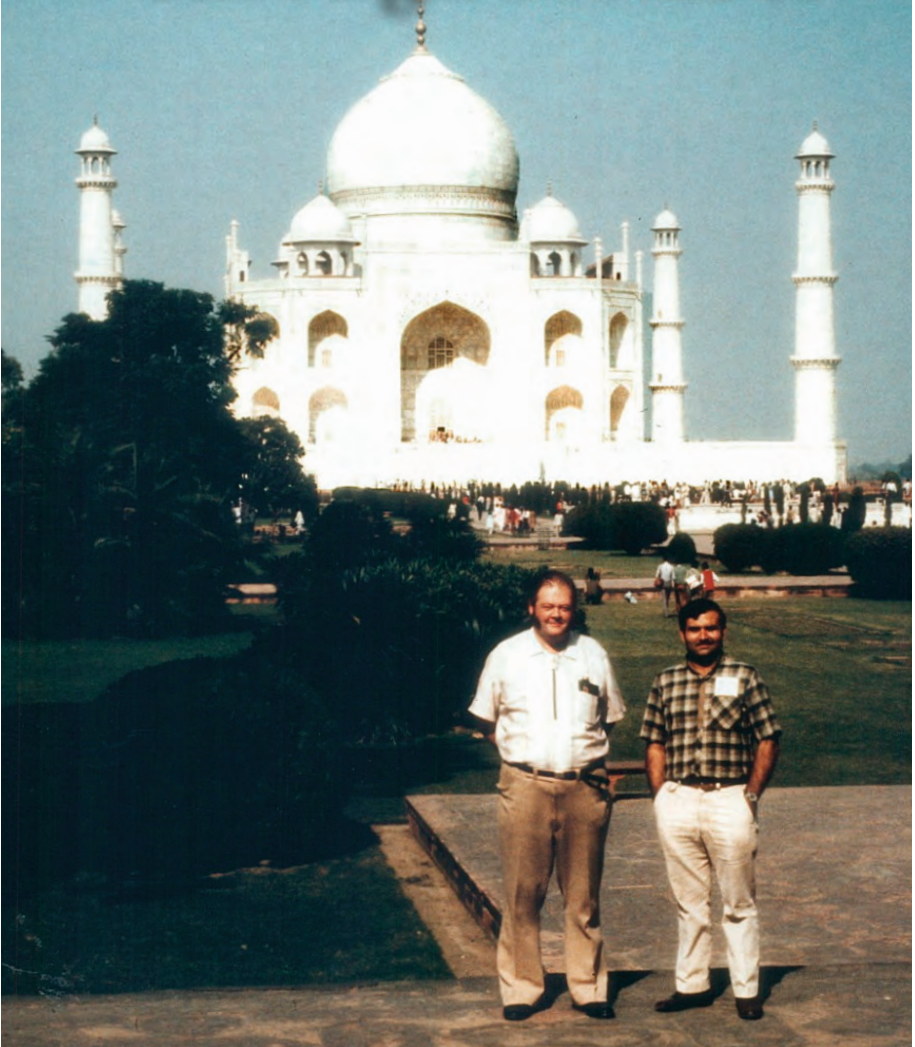
Book Chapter by *D. V. Giri*  
**NEMP Radiating Antenna**  
edited by J.D. Taylor  
CRC Press, 1994



**Ultra-Wideband, Short Pulse  
Electromagnetics 9**  
edited by Frank Sabath, D.V. Giri,  
Farhad Rachidi and Armin Kaelin  
Springer; May 2010

D. V. GIRI

# World Travel Through Pictures



C. E. Baum and D. V. Giri — Taj Mahal, Agra, India 1987





Prof. U.R. Rao, Chairman, Space Commission, (second from left) who inaugurated an international conference on electromagnetic interference and compatibility in Bangalore on Thursday, is seen with some foreign scientists and Prof. C.N.R. Rao, Director, Indian Institute of Science (third from right). Others seen are: Mr. Cliff Giles from USA (extreme left), Dr. D.V. Giri (third from left), Dr. Carl E. Baum from USA (second from right) and Col. Dr. G.K. Deb, Convener of the conference, (extreme right).

## Electromagnetism meet opens in City

By Our Staff Reporter

BANGALORE, Sept. 10. — Chairman of the Space Commission and Secretary Department of Space, Prof. U.R. Rao today inaugurated a two-day international conference and workshop on "Electromagnetic interference and compatibility," here.

He said the problem of electromagnetic interference (EMI) and electromagnetic compatibility (EMC) had great bearing on the scientific and industrial front. The electronic engineering industry today faced this hurdle with knowledge in this field still in its infancy, he said.

Pointing out that electromagnetic phenomena was similar in some ways to human relationship, as far as interference and compatibility were concerned, he said it was first understood with the advent of radio when EMI came in the way of clear transmission. Micro-miniaturisation technology had further complicated the problems in the field of electromagnetism.

**AEROSPACE SYSTEMS:** EMI problems were manifest especially in aerospace systems, because the instruments had to stand high acceleration and vibration, and the electromagnetic impulses in the radiation environment in space. Adequate knowledge in the field of EMI and EMC would help in reducing func-

tional anomalies in communication satellites, especially those in geostationary orbits.

Mr. Rao said that despite modulations, the spectrum of frequencies was so small that it was imperative that EMI be negated to optimise the use of available frequencies. This was very important, in the light of the growing demands on space communication, he pointed out.

Mr. Rao noted that though the emerging fibre optical and optical signal technologies would greatly reduce the problems of EMI, the increased use of VLSIs would throw a challenge to scientists in the field of EMI and EMC. He highlighted the need for legislation of control of the radio spectrum emissions to ensure optimum operations of a variety of electronic sub-systems.

Mr. Rao stressed the need for a practical approach to the study of EMI through intensive testing and analysis.

**MATERIAL SCIENCE:** Presiding over the inaugural function, Director of the Indian Institute of Science Prof. C.N.R. Rao said that material science had an important role to play in the study of EMI and EMC. He added that high temperature material for electronics (super conductivity) would pose a great challenge to EMI en-

gineers.

Pointing out that study of EMI and EMC in scientific institutions was not up to the mark, he said curriculum must be updated and stress laid on research efforts. He urged EMI engineers to bear in mind the fast changes on the technological scene.

Earlier, Col. G.K. Deb of the Electronics and Radar Development Establishment introduced the theme of the conference as being an attempt to understand and overcome EMI in digital systems and sub-systems.

Distinguished scientist Dr. R.P. Shenoy welcomed the gathering. Prof. H.P. Khincha proposed a vote of thanks.

Over 300 delegates from several countries, including the US, China, Poland, the UK, Germany, Japan and Switzerland are taking part in the two-day deliberations. About 80 papers on various aspects of EMI and EMC will be presented.

The conference has been organised jointly by the Indian Institute of Science, the LRDE, Institute of Electronics and Telecommunication Engineers (Bangalore chapter) and the Institute of Electrical and Electronic Engineers Inc., the US (Bangalore section).

C. Giles, D. V. Giri and C. E. Baum with Indian Hosts in a Newspaper Article



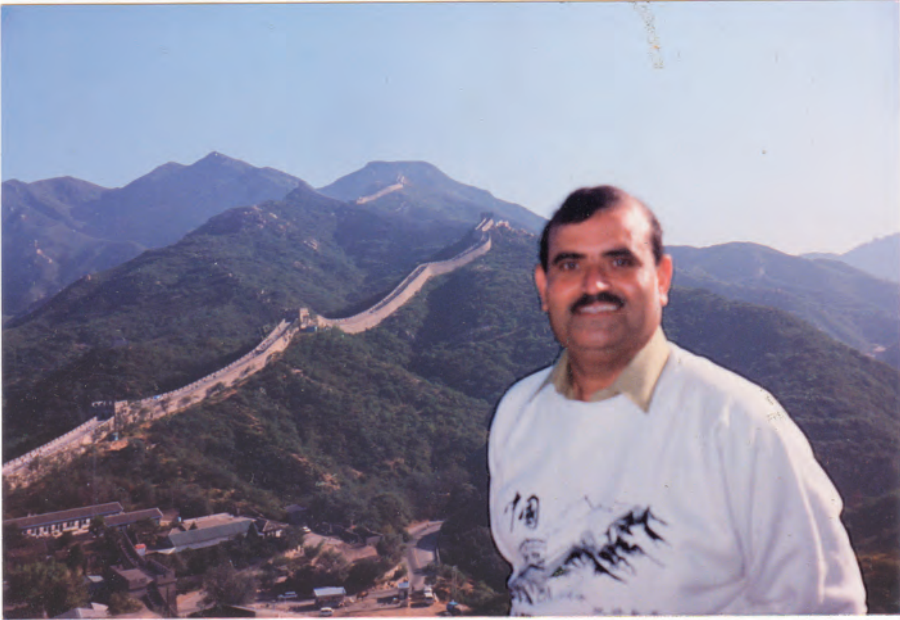
**EMP-201 short course in Bengaluru, India in 1989**



**HPE Laboratory, armasuisse, Switzerland in 1995**



MY JOURNEY WITH CARL



**Great wall of China in 1993. Technical workshop offered in Beijing by Baum, Giri, Vance and Giles**



**HPE-201 short course in Jeju, South Korea in 2005**

# In Memoriam of Carl Edward Baum (1940-2010)

*Requiescat in pace*

**His ideas kept flowing like a mighty river.**

*Carl Baum, mentor to many, took his last breath peacefully on December 2, 2010 in Albuquerque, NM.*



**Carl at his 70th Birthday Party in Ottawa during AMEREM 2010**

**C**arl was born in Binghamton, New York, on February 6, 1940. He received his B.S. (with honors), M.S., and Ph.D. degrees in electrical engineering from the California Institute of Technology, Pasadena, CA in 1962, 1963, and 1969, respectively. Following his B.S., he received his commission in the Air Force and was stationed at the Air Force Weapons Laboratory at Kirtland AFB, Albuquerque, NM. He served from 1963 until 1971 as an officer, and then accepted a civilian position and retired as a Senior Scientist in 2005. Since his retirement from USAF, he was a Distinguished Professor in the Dept. of ECE, the University of New Mexico.

## MY JOURNEY WITH CARL

During his military career, he was awarded the Air Force Research and Development Award and the Air Force Nomination to Ten Outstanding Young Men of America. In a career that spanned five decades, this remarkably creative engineer introduced innumerable new concepts in mathematics, electromagnetic theory and system design, many of which remain the standards of excellence today. From his earliest designs in EMP sensors and simulators to the latest developments in high-power microwave and ultra-wideband antenna and system design, Dr. Carl Baum's research has remained ever on the forefront of technology. His advances in EM theory have left an indelible mark and a lasting legacy on the technical world and have led to much of what we do today in EMP, HPM, and Target ID.



**H**is scientific contributions were prodigious. He has written innumerable technical notes, articles, books, and presentations and was the editor of the Note Series that has published state-of-the-art research results for the past 45 years. He received the Richard R. Stoddart award of the IEEE EMC Society (1984), and the Harry Diamond Memorial Award (1987), the AFSC Harold Brown Award (1990), and the Air Force Basic Research Award (Honorable Mention) in 1999. In addition, he has received 5 Best Paper Awards from the AMEREM/EUROEM Awards Committee, and he and his research team were honored as an AFOSR Star Team for 2000-2002 and received the 1st annual R. Earl Good Award from AFRL (2004) for their work in target identification. He was named an IEEE Fellow in 1984, an EMP Fellow in 1986, and the first Air Force Research Laboratory Fellow in 1996, but the honors that meant the most to him came in July of 2004 when he was bestowed with an Honorary Doctorate of Engineering by Otto von Guericke University in Magdeburg, Germany during EUROEM 2004 and received a special honor from his colleagues in Russia for his lifetime of achievements. He received the IEEE John Kraus Antenna Award (2006) and also the Electromagnetics Award from IEEE (2007). He was a member of Commissions A, B, & E of the U.S. National Committee of the International Union of Radio Science (URSI) and established the SUMMA Foundation which sponsors various electromagnetics-related activities including scientific conferences, publications, short courses, fellowships, and awards. He has led EMP short courses and HPE workshops around the globe. Dr. Baum was an active organizer of scientific conferences and workshops that bring together researchers from all over the United States and the world to share the latest in electromagnetic research.

When not putting his new ideas in mathematics and electromagnetics (EM) into new technical notes or organizing meetings, Dr. Baum enjoyed playing the piano and creating his own musical compositions, many of which have been heard at the biennial AMEREM and EUROEM conferences. His compositions can also be heard at one of the many churches in Albuquerque that host the annual concerts of the Albuquerque Symphony Orchestra and Chorus, and even at his own church where he used to be the choir director. Twenty-three of these compositions have been recorded.

Carl is survived by his two nephews and sister-in-law, George, Spencer, and Martha Baum of Albuquerque.



D. V. GIRI

# SHORT COURSES

## EMP Interaction and Hardening (EMP 201)

A week-long short course was first held at New Mexico Tech in Socorro NM USA in 1983. Since then, there have been many EMP-201 short courses. EMP short



courses were well received for both their content and the way they were conducted.

Carl invited me to participate as a faculty member at EMP-201 held at these locations.

**University of Nottingham, Nottingham, England,  
September 9 to 15, 1984**



**Park Hotel Mattenhof, Interlaken, Switzerland  
February 24 to March 2, 1985**



## EMP Interaction and Hardening (EMP 201)



Yxnerum Conference Center, Yxnerum, Sweden, June 8-14, 1986



Hotel Kalanit, Karmiel, Israel, August 16-22, 1987

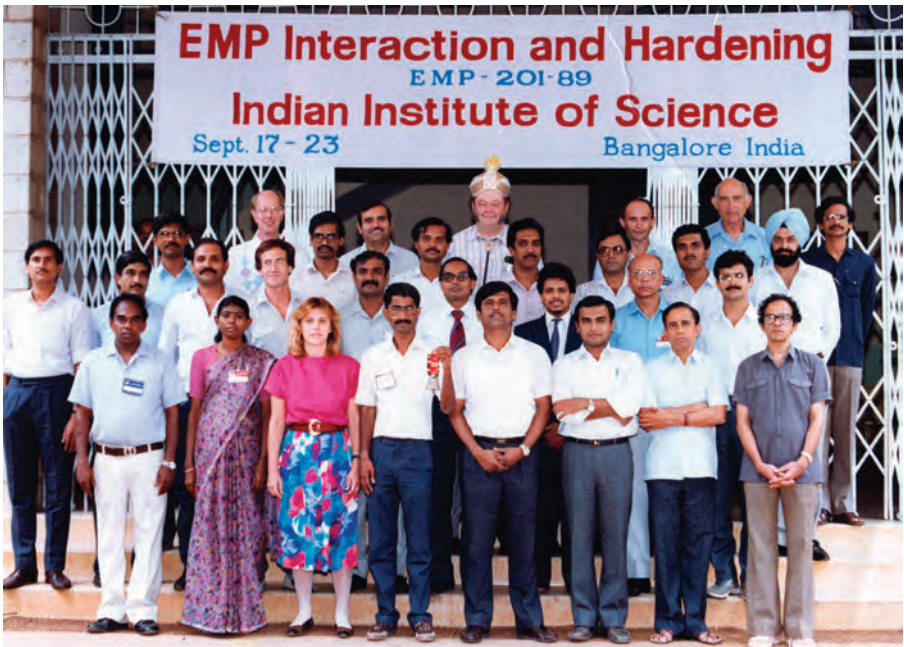
D.V. GIRI

## EMP Interaction and Hardening (EMP 201)

*EMP-201 short course was sponsored by the education committee of Summa Foundation.*



University of Michigan, Ann Arbor, MI, USA, August 7-13, 1988



Indian Institute of Science, Bengaluru, India, Sept. 17-23, 1989



MY JOURNEY WITH CARL

# SHORT COURSES

## High-Power Electromagnetics (HPE 201)

*Short course was sponsored by the education committee of Summa Foundation.*

In 1989, we witnessed the dissolution of the Soviet Union. Since then the world has changed, and with this the course material also needed to change. Emphasis on the environments from high-power microwaves (HPM) extending through



high-power impulses (HPI). HPE-201 was offered for the first time in 2003 at New Mexico Tech, Socorro, New Mexico, USA. This was followed by similar courses in South Korea in 2005, France in 2007 and Switzerland in 2009.

**New Mexico Tech, Socorro, New Mexico, USA  
27 July- 2 August 2003**



**Cheju National University, Cheju, South Korea, May 22-28, 2005**

D.V. GIRI

## EMP Interaction and Hardening (EMP 201)



Bonascre, Ax les Thermes, FRANCE, December 2 - 8, 2007



“Le Vieux Chalet” in Château-d’Oex, Switzerland, Sept. 27 to Oct. 3, 2009

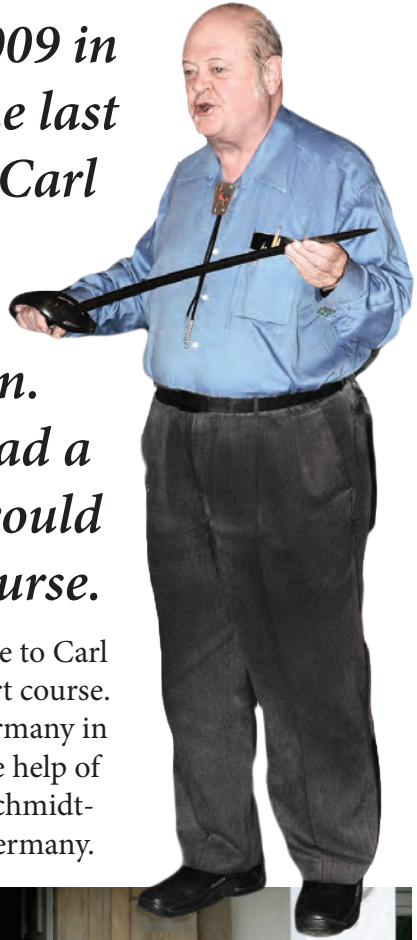


MY JOURNEY WITH CARL

*HPE 201-2009 in Switzerland was the last short course that Carl taught. At this course, he anointed me to carry on the tradition.*

*It is as if he had a premonition that it would be his last short course.*

That day, I made a silent promise to Carl I would at least organize one short course. This promise was fulfilled in Germany in September 2011 with the help of Dr. Lars Ole Fichte of Helmut-Schmidt-Universität Hamburg, Germany.



**Group photo of HPE 201-2011, Schloss Noer  
Germany, Sept. 18-24, 2011**

D. V. GIRI

## 2006 JOHN KRAUS ANTENNA AWARD

*The John Kraus Antenna Award honors an individual or team that has made a significant advance in antenna technology.*



Dr. C. E. Baum



Dr. D.V. Giri



Dr. E.G. Farr

In 2006, this was awarded to Carl E. Baum, D. V. Giri, and Everett G. Farr

*“For development of novel and innovative ultra-wideband antenna concepts that have enabled a new area of electromagnetics.”*

## Best HPE Papers

### 1990-1991, given 7 July 1992

#### *Best Applied Paper in High-Power Electromagnetics*

D.V.Giri, “Preliminary Considerations for High-Power Microwave (HPM) Radiating Systems, Circuit and Electromagnetic Systems Design,” Note 40, December 1990.

### 2002-2003, given 12-16 July 2004

#### *Best Applied Paper in High-Power Electromagnetics*

C.E. Baum, W. L. Baker, W.D. Prather, W.A. Walton III, R. Hackett, J.M. Lehr, J.W. Burger, R.J. Torres, J. O’Loughlin, H.A. Dogliani, J.S. Tyo, J.S.H. Schoenberg, G.J. Rohwein, D.V. Giri, I. D. Smith, R. Altes, G. Harris, J. Fockler, D.F. Morton, D. Mclemore, K.S.H. Lee. T. Smith, H. LaValley, M.D. Abdalla, M.C. Skipper, F. Gruner, B. Cockreham, and E.G. Farr, “JOLT: A Highly Directive, Very Intensive, Impulse-Like Radiator,” Sensor and Simulation Note 480, November 2003.

### 2006-2007, given 23 July 2008

#### *Best Applied Paper in High-Power Electromagnetics*

Fredrick M. Tesche, D.V. Giri, and William D. Prather, “Scattered EM Field Responses of Canonical Scatterers Illuminated by an Impulse Radiating Antenna (IRA),” Circuit and Electromagnetics System Design Note 53, April 2006.

D. V. GIRI

# TECHNICAL WORKSHOPS



High-Power Microwaves, Technion, Haifa, Israel, August 26-28, 1991



High-Power Microwaves, Advitaberg, Sweden, September 2-3, 1992



MY JOURNEY WITH CARL



High-Power Microwaves, Euskirchen, Germany, September 7-9, 1992



High-Power Electromagnetics, Bengaluru, India, March 20-25, 1995



**High-Power Electromagnetics, Interlaken, Switzerland, March 13-16, 1995**



**High-Power  
Electromagnetics  
TNO, The Hague,  
The Netherlands,  
September 26, 1996**

***Publications in the NOTES and MEMO Series many of which  
were co-authored with Carl***

***Most of these publications can be downloaded from:  
<http://www.ece.unm.edu/summa/notes>***

- 01) **SENSOR AND SIMULATION NOTE 219**, C. E. Baum, D. V. Giri, and R. D. Gonzalez, Electromagnetic Field Distribution of the TEM Mode in a Symmetrical Two-Parallel-Plate Transmission Line, 1 Apr 1976.
- 02) **SENSOR AND SIMULATION NOTE 247**, D. V. Giri, C. E. Baum, and H. Schilling, Electromagnetic Considerations of a Spatial Modal Filter for Suppression of Non-TEM Modes in the Transmission-Line Type of EMP Simulators, 29 December 1978
- 03) **SENSOR AND SIMULATION NOTE 261**, D. V. Giri, T. K. Liu, F. M. Tesche, and R. W. P. King, Parallel Plate Transmission Line Type of EMP Simulators: A Systematic Review and Recommendations, 1 April 1980.
- 04) **SENSOR AND SIMULATION NOTE 284**, D. V. Giri and C. E. Baum, Airborne Platform for Measurement of Transient or Broadband CW Electromagnetic Fields, 22 May 1984.
- 05) **SENSOR AND SIMULATION NOTE 287**, Y.-G. Chen, R. Crumley, C. E. Baum, and D. V. Giri, Field-Containing Inductors, 18 July 1985.
- 06) **SENSOR AND SIMULATION NOTE 288**, Y.-G. Chen, R. Crumley, S. Lloyd, C. E. Baum, and D. V. Giri, Lumped Element Networks for Replacing Sections of a Buried Transmission Line, 12 September 1985.
- 07) **SENSOR AND SIMULATION NOTE 289**, C. E. Baum and D. V. Giri, The Distributed Switch for Launching Spherical Waves, 28 August 1985.
- 08) **SENSOR AND SIMULATION NOTE 290**, Y.-G. Chen, S. Lloyd, R. Crumley, C. E. Baum, and D. V. Giri, Surface-Current-Density Measurements, 14 October 1985.
- 09) **SENSOR AND SIMULATION NOTE 292**, Y.-G. Chen, S. Lloyd, R. Crumley, C. E. Baum, and D. V. Giri, Design Procedures for Arrays which Approximate a Distributed Source at the Air-Earth Interface, 1 May 1986.
- 10) **SENSOR AND SIMULATION NOTE 294**, D. V. Giri and C. E. Baum, Equivalent Displacement for a High-Voltage Rollup on the Edge of a Conducting Sheet, October 1986.
- 11) **SENSOR AND SIMULATION NOTE 299**, D. V. Giri and C. E. Baum, Early Time Performance at Large Distances of Periodic Arrays of Flat-Plate Conical Wave Launchers, 1 April 1987.
- 12) **SENSOR AND SIMULATION NOTE 301**, N. Ari and D. V. Giri, Review of Characteristic Impedance of Two Conductor Transmission Lines, 22 May 1987.
- 13) **SENSOR AND SIMULATION NOTE 302**, D. V. Giri, H. Schar, D. Hansen, and H. Hoitink, Monopole Emissions In a TEM Cell and its Relationship to Emissions in Free Space, 22 May 1987.
- 14) **SENSOR AND SIMULATION NOTE 316**, D. V. Giri, Impedance Matrix Characterization of an Incremental Length of a Periodic Array of Wave Launchers, April 1989.
- 15) **SENSOR AND SIMULATION NOTE 318**, D. V. Giri, A Family of Canonical Examples for



High-Frequency Propagation on Unit Cell of Wave-Launcher Array, June 1989.

16) **SENSOR AND SIMULATION NOTE 322**, Y. G. Chen, S. Lloyd, R. Crumley, C. E. Baum, and D. V. Giri, Low Voltage Experiments Concerning a Section of a Pulsar Array Near the Air-Earth Interface, February 1990.

17) **SENSOR AND SIMULATION NOTE 326**, D. V. Giri, Canonical Examples of High-Power Microwave (HPM) Radiation Systems for the Case of One Feeding Waveguide, April 1991.

18) **SENSOR AND SIMULATION NOTE 331**, D. V. Giri, and Y. Rahmat-Samii, Effects of Waveguide Dispersion on High-Power Microwave Signals, September 1991.

19) **SENSOR AND SIMULATION NOTE 334**, Y. Rahmat-Samii, D. W. Duan, and D. V. Giri, Canonical Examples of Reflector Antennas for High Power Microwave Applications, October 1991.

20) **SENSOR AND SIMULATION NOTE 346**, D. V. Giri and S. Y. Chu, On the Low-Frequency Electric Dipole Moment of Impulse Radiating Antennas (IRA's), October 19 92.

21) **SENSOR AND SIMULATION NOTE 349**, Y. Rahmat-Samii and D. V. Giri, Analysis of Blockage Effects on TEM-FED Paraboloidal Reflector Antennas (Part II: TEM Horn Illumination), November 1992.

22) **SENSOR AND SIMULATION NOTE 365**, D.V. Giri and C.E. Baum, Reflector IRA Design and Boresight Temporal Waveforms, 2 February 1994.

23) **SENSOR AND SIMULATION NOTE 366**, D.V. Giri, Time-Domain Radiated Fields of a Resistively Loaded Bi-Conical Antenna Based on a Transmission-Line Model, 1 April 1994.

24) **SENSOR AND SIMULATION NOTE 368**, D.V. Giri and C.E. Baum, Field Containing Solenoidal Inductors, 4 July 1994.

25) **SENSOR AND SIMULATION NOTE 382**, D.V. Giri, H. Lackner, I.D. Smith, D.W. Morton, C.E. Baum, J.R. Marek, D. Scholfield and W.D. Prather, A Reflector Antenna for Radiating Impulse-Like Waveforms, 4 July 1995.

26) **SENSOR AND SIMULATION NOTE 386**, D.V. Giri, Radiated Spectra of Impulse Radiating Antennas (IRAs), 23 November 1995.

27) **SENSOR AND SIMULATION NOTE 402**, D.V. Giri and C.E. Baum, Design Guidelines for Flat-Plate conical Guided-Wave EMP Simulators with Distributed Terminators, 25 October 1996.

28) **SENSOR AND SIMULATION NOTE 469**, D.V. Giri, V. Carboni and Jane Lehr, Design, Fabrication and Testing of a Timed-Array of TEM Horns for Beam Steering, 1 May 2002.

29) **SENSOR AND SIMULATION NOTE 480**, C.E. Baum, W.L. Baker, W.D. Prather, W.A. Walton



**Carl donated a physics lab to the Christian Brothers Academy in Syracuse, NY in honor of his family**

## MY JOURNEY WITH CARL

III, R. Hackett, J.M. Lehr, J.W. Burger, R.J. Torres, J.O'Loughlin, H.A. Dogliani, J.S. Tyo, J.S.H. Schoenberg, G.J. Rohwein, D.V. Giri, I.D. Smith, R. Altes, G. Harris, J. Fockler, D.F. Morton, et al., JOLT: A Highly Directive, Very Intensive, Impulse-Like Radiator, November 10, 2003.

30) **SENSOR AND SIMULATION NOTE 538**, D. V. Giri, William D. Prather and Carl E. Baum, The Relationship Between NEMP Standards and Simulator Performance Specifications, Idus Martiae 2009.

31) **SENSOR AND SIMULATION NOTE 545**, K. Sunitha, D.V. Giri and M. Joy Thomas, Radiation Patterns of a Reflector Type of Impulse Radiating Antenna (IRA) Relating Time and Frequency Domains, October 25, 2009.

32) **SENSOR AND SIMULATION NOTE 546**, Peak Power Gain in Time Domain of Impulse Radiating Antennas (IRAs), D. V. Giri, 25 October 2009.

33) **SENSOR AND SIMULATION NOTE 550**, D.V. Giri and F.M. Tesche, Energy Patterns of the Prototype-Impulse Radiating Antenna (IRA), Feb. 2010.

34) **SENSOR AND SIMULATION NOTE 553**, D. V. Giri, Modifications to a Commercial Impulse Radiating Antenna (IRA) for Accurate Mono-static Impulse Radar Application, February 2011.

35) **SENSOR AND SIMULATION NOTE 557**, F. M. Tesche and D. V. Giri Swiss Impulse Radiating Antenna (SWIRA) Characterization in the Presence of a Local Ground Plane (Earth), October 2011.

36) **THEORETICAL NOTES 366**, D.V. Giri and S.L. Dvorak, Propagation of Impulse-Like Waveforms Through the Ionosphere Modeled by a Cold Plasma, 2 February 1996.

37) **INTERACTION NOTE 337**, D. V. Giri, F. M. Tesche, and S. K. Chang, A Note on the Transverse Distributions of Surface Charge Densities on Multi-conductor Transmission Lines, 1 April 1978.

38) **INTERACTION NOTE 349**, D. V. Giri, S. K. Chang, and F. M. Tesche, A Coupling Model for a Pair of Skewed Transmission Lines, 12 September 1978.

39) **INTERACTION NOTE 351**, F. M. Tesche, T. K. Liu, S. K. Chang, and D. V. Giri, Field Excitation of Multi-conductor Transmission Lines, September 1978.

40) **INTERACTION NOTE 428**, D. V. Giri and D. B. Phuoc, Natural Frequencies and Natural Modes of an Aircraft Using a Six Stick-Model with Different Radii, 25 October 1982.

41) **INTERACTION NOTE 468**, D. Hansen, H. Schar, D. Konigstein, H. Hoitink, and D. V. Giri, Field Excitation of a Two-Wire Transmission Line in a TEM Cell, 4 July 1988.



**Carl at the Monastery of Christ in the Desert, Abiquiu, New Mexico, June 2007**

- 42) **INTERACTION NOTE 470**, D. Hansen, H. Schar, D. Konigstein, H. Hoitink, and D. V. Giri, Response of an Overhead Wire Near a NEMP Simulator, September 1988.
- 43) **INTERACTION NOTE 485**, M. Nyffeler, B. Braendli, B. Reusser, E. Doerr, D. V. Giri, and E. R. Tomer, On the Interaction of Electromagnetic Fields with Wire Cage Structures, 25 October 1991.
- 44) **INTERACTION NOTE 602**, D.V. Giri and T. T. Wu, Double-Pulse Technique for Defending from Hostile Systems, July 2006.
- 45) **INTERACTION NOTE 612**, K. Sunitha, M. Joy Thomas and D.V. Giri, Induced Transients on an Underground Cable by Hyperband Signals, 25 October 2009.
- 46) **INTERACTION NOTE 621**, On the Natural Oscillation Frequencies of a Straight Wire Antenna, F. M. Tesche and D. V. Giri, June 2011.
- 47) **MEASUREMENT NOTE 33**, D. V. Giri, Effective Rise Time Resulting from a Convolution of Waveforms with Exponential and Gaussian Rise Characteristics, 14 May 1987.
- 48) **SWITCHING NOTE 32**, V. Carboni, H. Lackner, D.V. Giri and Jane Lehr, The Breakdown Fields and Risetimes of Select Gases Under Conditions of Fast Charging (~20 ns and less) and High Pressures (20-100 atmospheres), May 2002.
- 49) **CIRCUIT AND ELECTROMAGNETIC SYSTEM DESIGN NOTE 33**, D. V. Giri and C. E. Baum, "Theoretical Considerations for Optimal Positioning of Peaking Capacitor Arms about a Marx Generator Parallel to a Ground Plane, June 1985.
- 50) **CIRCUIT AND ELECTROMAGNETIC SYSTEM DESIGN NOTE 35**, D. V. Giri and C. E. Baum, Optimal Positioning of a Set of Peaker Arms in a Ground Plane, February 1988.
- 51) **CIRCUIT AND ELECTROMAGNETIC SYSTEM DESIGN NOTE 36**, D. V. Giri and C. E. Baum, Coupled Transmission-Line Model of Marx Generator with Peaking-Capacitor Arms, Jun2 1988.
- 52) **CIRCUIT AND ELECTROMAGNETIC SYSTEM DESIGN NOTE 40**, D. V. Giri, Preliminary Considerations for High-Power Microwave (HPM) Radiating Systems, December 1990.
- 53) **CIRCUIT AND ELECTROMAGNETIC SYSTEM DESIGN NOTE 50**, D.V. Giri, F.M. Tesche, C.E. Baum, An Overview of High-Power Electromagnetic (HPEM) Radiating and Conducting Systems, February 2006.
- 54) **CIRCUIT AND ELECTROMAGNETIC SYSTEM DESIGN NOTE 53**, F.M. Tesche, D.V. Giri, W.D. Prather, Scattered EM Field Responses of Canonical Scatterers Illuminated by an Impulse Radiating Antenna (IRA), April 2006.
- 55) **CIRCUIT AND ELECTROMAGNETIC SYSTEM DESIGN NOTE 58**, D. V. Giri, Switched Oscillators and Their Integration into Helical Antennas, July 4, 2009.
- 56) **ENERGY STORAGE AND DISSIPATION NOTE 10**, D. V. Giri and C. E. Baum, High-Frequency Capacitors, 15 March1990.
- 57) **ENERGY STORAGE AND DISSIPATION NOTE 11**, A.W. Kälin, B.R. Brandli and D.V. Giri, Development and Characterization of High Frequency Capacitors, July 4, 1994.
- 58) **MATHEMATICS NOTE 40**, D. V. Giri, B. K Singaraju, and C. E. Baum, Accurate Evaluation of the Impedance Matrix Elements in the Hallén Integral Equation for Wire Antennas, December 1975.
- 59) **MATHEMATICS NOTE 41**, D. V. Giri, On Delta Functions, Part I: A Review of Various Representations and Properties of Dirac Delta Functions, 12 January 1976.



## MY JOURNEY WITH CARL

60) **MATHEMATICS NOTE 42**, B. K. Singaraju, D. V. Giri, and C. E. Baum, Further Developments in the Application of Contour Integration to the Zeros of Analytical Functions and Relevant Computer Programs, March 1976.

61) **MATHEMATICS NOTE 55**, D. V. Giri and C. E. Baum, Application of Cauchy's Residue Theorem in Evaluating the Poles and Zeros of Complex Meromorphic Functions and Opposite Computer Programs, 25 May 1978.

62) **MATHEMATICS NOTE 70**, D. V. Giri, T. L. Brown, and J. P. Martinez, Numerical Evaluation of Jacobian Elliptic Functions, Elliptic Integrals of all Three Kinds and Jacobi Zeta Function, 1 April 1981.

63) **INTERACTION APPLICATION MEMO 27**, S. K. Chang, F. M. Tesche, D. V. Giri and T. K. Liu, A Comparison of Experimental and Numerical Results for Multiconductor Transmission Line Networks, August 1978.



### Carl with the kids at his beloved Christian Brothers Academy in Syracuse, NY

64) **INTERACTION APPLICATION MEMO 28**, S. K. Chang, F. M. Tesche, D. V. Giri and T. K. Liu, Calculated and Experimental Responses of EMP Excited Power Cables on TACAMO Aircraft, August 1978.

65) **MISCELLANEOUS SIMULATOR MEMO 8**, C. E. Baum, D. V. Giri and D. R. Rossbach, Some Performance Parameters for Various EMP Simulators, 4 November 1976.

66) **MISCELLANEOUS SIMULATOR MEMO 11**, D. V. Giri, C. E. Baum, R. W. P. King, D. Bjejer and S. K. Wan, Experimental Investigations into Higher-Order Mode Effects and Simulator/Object Interaction in Parallel-Plate Transmission Line Geometries, 26 May 1977.

67) **ALECS MEMO 8**, D. V. Giri, C. E. Baum, C. M. Wiggins, W. O. Collier and R. L. Hutchins, An Experimental Evaluation and Improvement of the ALECS Terminator, 8 May 1977.

68) **ALECS MEMO 11**, D. V. Giri and C. E. Baum, Design and Suggested Methods of Evaluating a Spatial Modal Filter, 22 January 1979.

69) **ATLAS MEMO 18**, C. E. Baum, D. F. Higgins and D. V. Giri, Pulser Test Results and Preliminary Estimation of Transient Electric Field Waveforms in ATLAS-I, 7 October 1976.

70) **ATLAS MEMO 19**, C. E. Baum and D. V. Giri, Low Frequency Distant Fields for ATLAS I and II and Comparison with ALECS and ARES, 29 October 1976.

71) **ATLAS MEMO 21**, C. E. Baum and D. V. Giri, Environmental Improvements in ATLAS I Derivable from Pulser Improvements, 13 December 1976.

72) **ATLAS MEMO 22**, C. E. Baum, D. V. Giri and K. C. Chen, An Overview of EM Considerations of ATLAS I in the Context of Current and Future Efforts, 5 January 1977.

73) **ATLAS MEMO 25**, F. R. Graham and D. V. Giri, Review of Electrical Characteristics of Marx Pulsers in ATLAS I, 10 September 1979.

74) **ATLAS MEMO 26**, D. V. Giri, A Study of Mono-cone Switch Used with Marx Pulsers, 28 September 1979.

75) **ATLAS MEMO 31**, D. V. Giri, Electromagnetic Considerations for Trailing Wire Antenna Testing in ATLAS I Facility, 22 June 1983.

76) **ATLAS MEMO 32**, D. V. Giri and S. H. Sands, Effects of Asynchronism Between East and West Pulsers in ATLAS I Facility, 1 February 1984.

77) **ATLAS MEMO 33**, D. V. Giri, R. S. Noss and R. L. Hutchins, Effects of Notch after the Peak in Marx Pulser Voltage in ATLAS I Facility, 1 March 1984.

78) **ATLAS MEMO 34**, D. V. Giri, R. S. Noss and S. H. Sands, Further Considerations for Trailing Wire Antenna Testing in ATLAS I Facility, 1 March 1984.

79) **ATLAS MEMO 35**, D. V. Giri, Optimal Positioning of Peaking Capacitor Arms in ATLAS I, 1 April 1985.

80) **ATLAS MEMO 36**, D. V. Giri, Peaking Capacitor Specifications and Acceptance Test Procedures, 27 April 1985.

81) **ATLAS MEMO 37**, D. V. Giri, F. E. White, G. Wood and B. Melton, Pulse Propagation in ATLAS I with a Step Function Source Near Apex, 1 April 1986.

82) **ATLAS MEMO 38**, D. V. Giri, Wave Transport Across the Marx-Peaker Assembly in ATLAS I for the Case of 8 Optimally Distributed Peaker Arms, 27 June 1988.

83) **DIESES MEMO 1**, T. L. Brown and D. V. Giri, Electromagnetic Field Computation for a Conical Plate Transmission Line Type of Simulator, 23 November 1983.



Carl hung this portrait in his dining room

## MY JOURNEY WITH CARL

- 84) **DIESES MEMO 2**, D. V. Giri, T. L. Brown and H. Schilling, Vanishing Radial Electromagnetic Fields in a Conical Transmission Line, 2 February 1984.
- 85) **INSIEME Memo 1**, D. V. Giri, Electromagnetic Design Considerations of INSIEME, 2 February 1991.
- 86) **INSIEME Memo 2**, D. V. Giri and T. L. Brown, Characteristics of the Spherical TEM Wave Propagation in the INSIEME, 2 February 1991.
- 87) **INSIEME Memo 3**, D. V. Giri and C. Zuffada, Top Plate Design Along with its Support Structures, 2 February 1991.
- 88) **INSIEME Memo 4**, D. V. Giri and C. Zuffada, Ground Plane Design Considerations, 2 February 1991.
- 89) **INSIEME Memo 5**, D. V. Giri and C. Zuffada, Lightning Protection, 2 February 1991.
- 90) **INSIEME Memo 6**, D. V. Giri, Terminator Design, 2 February 1991.
- 91) **INSIEME Memo 7**, K. Salisbury, Y. G. Chen, R. White and D. V. Giri, Pulsar/Simulator Interface, 2 February 1991.
- 92) **INSIEME Memo 8**, D. V. Giri, Experimental Characterization of INSIEME, 2 February 1991.
- 93) **INSIEME Memo 9**, D. V. Giri, Field Uniformity in the Working Volume, 2 February 1991.
- 94) **INSIEME Memo 10**, D. V. Giri, Data Acquisition Building, 2 February 1991.
- 95) **SAPIENS MEMO 12**, D. V. Giri, Terminator Design for SAPIENS-II, 14 December 1990.
- 96) **EM PLATFORM MEMO 1**, D. V. Giri and S. H. Sands, Design of B sensor for the Nose Boom of F-106B Aircraft, 5 September 1983.
- 97) **EM PLATFORM MEMO 2**, D. V. Giri and S. H. Sands, Processing, Evaluation and Analysis of the Magnetic Field Data Acquired by the F-106B Nose boom Sensor, 26 August 1985.
- 98) **EMP EDUCATION MEMO 1**, C. E. Baum and D. V. Giri, The Lack of Electromagnetic Skills Among EMP Personnel, 12 June 1977.
- 99) **MICROWAVE MEMO 5**, C. E. Baum and D. V. Giri, Mark N Phaser, 4 February 1992.
- 100) **MICROWAVE MEMO 6**, D. V. Giri and Y. Rahmat-Samii, Mark 0 Phaser, 1 May 1992.
- 101) **MICROWAVE MEMO 7**, D. V. Giri and Y. Rahmat-Samii, Useful Future Experiments for HPM Radiation Systems, 7 August 1992.
- 102) **PROTOTYPE IRA MEMO 1**, D. V. Giri and H. Lackner, Fabricational Details of Prototype IRAs, 1 May 1994.
- 103) **PROTOTYPE IRA MEMO 2**, D. V. Giri and H. Lackner, Preliminary Evaluation of the Terminating Impedance in the Conical-Line Feed of IRAs, 15 May 1994.
- 104) **PROTOTYPE IRA MEMO 3**, D. V. Giri, Design Considerations of a Uniform Dielectric Lens for Launching a Spherical TEM Wave onto the Prototype IRA, 15 May 1994.
- 105) **PROTOTYPE IRA MEMO 4**, D. V. Giri and H. Lackner, Estimates of Peak Values of Near and Far Fields of Prototype IRAs, 15 May 1994.
- 106) **PROTOTYPE IRA MEMO 7**, B. Cockreham & F.R. Gruner, D.V. Giri, H. LaValley, T. Smith, & D. McLemore, J. Burger, R. Torres, T. Tran, W. Prather and C. E. Baum, Fabricational Details of the 6-foot IRA, 28 August 2001.



## D . V . GIRI

107) **PROTOTYPE IRA MEMO 8**, M. Abdalla, M. Skipper, D.V. Giri, H. LaValley, T. Smith, & D. McMomore, J. Burger, R. Torres, T. Tran, W. Prather and C. E. Baum, Evaluation of the Terminating Impedance in the Conical-Line Feed of the 6-foot IRA, 15 April 2001.

108) **SYSTEM TEST MEMO 1**, C. E. Baum and D. V. Giri, Some Critical Factors in Obtaining Valid Information from EMP Tests on Complex Systems, 12 June 1977.

109) **MATRIX MEMO 1**, J. Burger, R. Torres, T. Tran, W. Prather, C. E. Baum, J. Demarest, T. Smith, K. S. H. Lee, H. LaValley, D. McMomore, M. Abdalla, M. Skipper B. Cockreham and D. V. Giri, Basic Electromagnetic Considerations, 25 October 2001.

110) **MATRIX MEMO 2**, J. Burger, R. Torres, T. Tran, W. Prather, C. E. Baum, J. Demarest, T. Smith, K. S. H. Lee, H. LaValley, D. McMomore, M. Abdalla, M. Skipper B. Cockreham and D. V. Giri, System Design Considerations, 25 October 2001.

111) **MATRIX MEMO 3**, J. Burger, R. Torres, T. Tran, W. Prather, C. E. Baum, J. Demarest, T. Smith, K. S. H. Lee, H. LaValley , D. McMomore, M. Abdalla, M. Skipper, B. Cockreham and D. V. Giri, Design of the Bi-Solenoidal Isolating Inductor, 25 October 2001.

112) **MATRIX MEMO 4**, J. Burger, R. Torres, T. Tran, W. Prather, C. E. Baum, J. Demarest, T. Smith, K. S. H. Lee, H. LaValley, D. McMomore, M. Abdalla, M. Skipper, B. Cockreham and D. V. Giri, Design Considerations of the Oil-dome, 25 October 2001.

113) **MATRIX MEMO 5**, J. Burger, R. Torres, T. Tran, W. Prather, C. E. Baum, J. Demarest, T. Smith, K. S. H. Lee, H. LaValley, D. McMomore, M. Abdalla, M. Skipper, B. Cockreham and D. V. Giri, Estimation of the Hot-Spot Fields, 25 October 2001.

114) **MATRIX MEMO 6**, J. Burger, R. Torres, T. Tran, W. Prather, C. E. Baum, J. Demarest, T. Smith, K. S. H. Lee, H. LaValley, D. McMomore, M. Abdalla, M. Skipper, B. Cockreham and D. V. Giri, Beamwidth and Antenna Gain, , 25 October 2001.



Carl in Kiel, Germany 2010

## MY JOURNEY WITH CARL

**In addition to the above list of NOTES and MEMOs**, there were also several technical documents which have not been formally published. They are: 1) A series called **DISCUS** Memos or Distributed Source Conducting medium Underground Simulator which deal with the subject of NEMP testing of underground objects.

2) A series called **HPEMF** Memos or High-Power Electromagnetic Fields Memos.

3) A series called **DOGMA** Memos or Dual-Oscillator Generator for Microwave Application Memos.

4) A series called **MEMBER** Memos or Marx Excited Mesoband Emitting Radiator Memos.

### *The AMEREM/EUROEM meetings*

These meetings have a rich history behind them. In 1978, Dr. Carl Baum organized the first Nuclear Electromagnetic Pulse Meeting or the NEM in Albuquerque, NM with support from Summa Foundation. This first meeting brought together scientists/engineers from the U.S. and Western Europe. At some point, the NEM was renamed as High-Power Electromagnetics Meeting or HPEM. When this meeting was held in 1994 in Bordeaux, France, it was renamed as EUROEM and subsequently, the meetings in North America have been called the AMEREM. These meetings have been held in every even year since 1978. We now have a new MEMO series called AMEREM/EUROEM Memos which document various aspects of these meetings.

### **Publications in the Journals and Conference Proceedings co-authored with Carl**

115) **PROCEEDINGS OF THE IEEE**, C.E. Baum, W. L. Baker, W. D. Prather, J. M. Lehr, J. P. O'Loughlin, D. V. Giri, I. D. Smith, R. Altes, J. Fockler, D. McLemore, M. D. Abdalla and M. C. Skipper, JOLT: A Highly Directive, Very Intensive Impulse-Like Radiator (Invited Paper), Vol.92, No.7, July 2004, pp1096-1109.

116) **IEEE Transactions on Plasma Science**, D. V. Giri, J. M. Lehr, W.D. Prather, C.E. Baum and R.J. Torres, Intermediate and Far Fields of a Reflector Antenna Energized by a Hydrogen Spark-Gap Switched Oscillator," Vol.28, No.5, October 2000, pp1631-1636.

117) **IEEE Transactions on Plasma Science**, D. V. Giri, H. Lackner, I. D. Smith, D. W. Morton, C. E. Baum, J. R. Marek, W. D. Prather and D. W. Scholfield, Design, Fabrication and Testing of a Paraboloidal Reflector Antenna and Pulser System for Impulse-Like Waveforms," , Vol.25, No.1, 1997, pp 318-326.

118) **Conference Record of the International Conference & Workshop on Electromagnetic Inference and Compatibility (INCEMIC)**, D. V. Giri and C.E. Baum "Optimal Positioning of a Set of Peaker Arms in a Ground Plane," Bangalore, India, September 14-16, 1989, pp 323-326.

120) **IEEE Transactions on Electromagnetic Compatibility**, D. V. Giri and C.E. Baum "Theoretical Considerations for Optimal Positioning of Peaking Capacitor Arms About a Marx generator Parallel to a Ground Plane," Vol. EMC-31, No. 2, May1989, pp 117-124.

121) **Proceedings of the 8th International Zurich Symposium on Electromagnetic Compatibility**, D. V. Giri and C.E. Baum "Early Time Performance at Large Distances of Periodic Arrays of Flat-Plate Conical wave Launchers," , Zurich, Switzerland, March 7-9, 1989, pp 323-326. 36)

122) **IEEE Transactions on Electromagnetic Compatibility**, D. V. Giri and C. E. Baum, "Theoretical Considerations for Optimal Positioning of Peaking Capacitor Arms About a Marx Generator Parallel to a Ground Plane," Vol. EMC-31, No. 2, May 1989.

123) **Electromagnetics**, D. V. Giri and C.E. Baum, "Airborne Platform for Measurement of

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Transient or Broadband CW Electromagnetic Fields," Vol. 8, No. 4, October-December 1988.

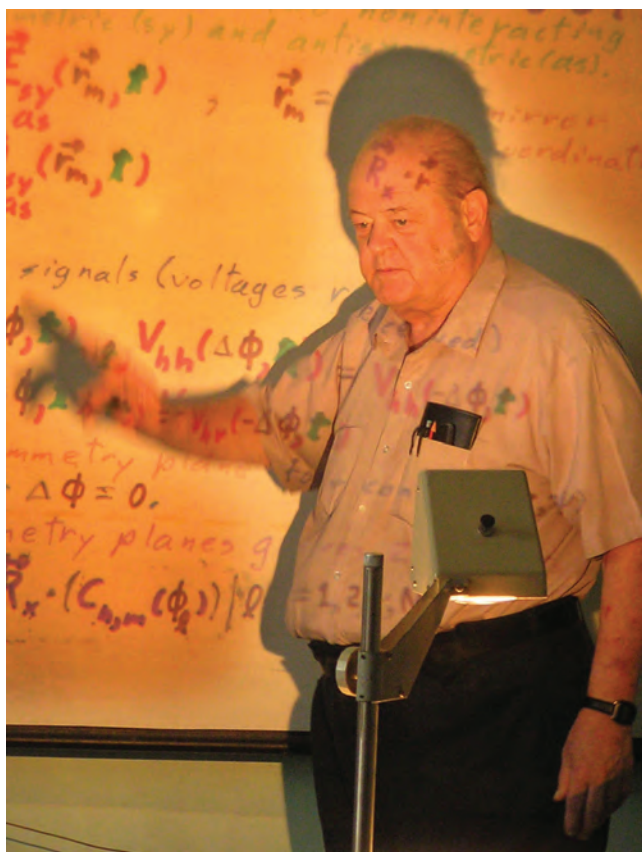
124) **IEEE Transactions On Electromagnetic Compatibility**, Y.G. Chen, R. Crumley, S. Lloyd, C.E. Baum and D. V. Giri, "Lumped Element Network for Replacing Sections of a Buried Transmission Line," Vol. EMC-30, No. 4, November 1988, pp 449-456.

125) **IEEE Transactions on Electromagnetic Compatibility**, Y.G. Chen, R. Crumley, S. Lloyd and C.E. Baum and D. V. Giri "Field Containing Conductors," with, Vol. 8, No. 4, August 1988, pp 345-350.

126) **Proceedings of the 7th International Zurich Symposium on Electromagnetic Compatibility**, D. V. Giri and C. E. Baum, "The Distribution Switch for Launching Spherical Waves," with C.E. Baum, Zurich, Switzerland, March 3-5, 1987, pp 205-212.

127) **Conference Record of the Workshop on Measurement of Electrical Quantities in Pulse Power Systems**, Y.G. Chen, S. Lloyd, R. Crumley, C.E. Baum and D. V. Giri, "Surface- Current-Density Measurement via Apertures," National Bureau of Standards, Gaithersburg, MD, March 5-7, 1986, pp 49-53.

128) **Proceedings of All India Conference and Workshop on Electromagnetic Compatibility (AICWEMC)**, D. V. Giri and C.E. Baum "Airborne Platform for Measurement of Transient or Broadband CW Electromagnetic Fields," Bangalore, India, November 28-26, 1985, pp 79-82.







*ut paucis complectar*

*(to put it briefly)*

**Carl was a singular man!  
He had no patience for nuances ...  
Spread his knowledge, not for profit,  
but as a prophet!**

## *Between the Flag Post and the Fountain*

D. V. Giri - July 4, 2011

This is about my friend, philosopher and guide, Carl Edward Baum. It is a collection of some random thoughts in no particular order. It is hard for me to talk about Carl in the past tense. This is not about his awards, his fame or his intellect, but Carl, the man.



Photo - Courtesy of Terry L. Brown



Biography deals with insights into his personal idiosyncrasies, relationships and incidents outside of his profession. That, this is not. Whatever the narrative mode, one needs a lens to look through. Talking about him is like swimming in a bottomless ocean. We documented his gigantic career on the occasion of his 65th birthday in 2005 in a Radio Science Bulletin publication. It is well known that he had a superior brain and used it well. It is ironic that it was his brain that failed in the last days of his life. If innovation is the currency of science, he was extraordinarily rich and shared his knowledge like a prophet and not for profit. He lived like a hermit and was generous with his wealth too. Not many of us know someone who drove a 48 year old automobile, which is allegedly “unsafe at any speed”. Carl was singular, if nothing else.

His visit to Harvard University in early 1970s brought us together. I was from Bellary, India and he from Binghamton, NY. I came to work with him in 1975 in Albuquerque. My daughter Priya was born that year in Albuquerque and he would come to my apartment for work after dinner and stay up to ~ 1 AM. My wife Vasanta would be working some nights at the Bernalillo County Mental Health Center in Albuquerque, and I was holding my newborn and working with Carl as I was getting initiated in challenging areas of applied electromagnetics. ATLAS-I (TRESTLE) was getting built and we would be figuring out the simulated fields for various pulser parameters! In 1975, little did I know that we

## MY JOURNEY WITH CARL

would be life-long collaborators and friends. What a journey it turned out to be, both literally and figuratively. I was fortunate to travel the world with him, from Albuquerque (A) to Zurich (Z). China, England, France, Germany, India, Israel, Italy, Scotland, Sweden, Ukraine are some of the countries that we went together, to learn and teach. How can I forget walking on the Great Wall of China with Carl telling me that four horsemen could ride side-by-side on the wall? Or walking in the gardens in front of the Taj Mahal in Agra, India. I have fond memories of driving through the length and breadth of Israel, with Carl educating me from the passenger seat. We also tasted nine different types of wines in a Crimean winery!

**T**he suddenness of his demise defies human understanding. I was honored to be a pall-bearer on *his last journey* during the funeral services. This patriotic American was a fountain of knowledge. He is now resting peacefully between a flag post and a fountain. On December 2, 2010, a light went out and a part of my world went dark. While his life made mine a bit easier, his untimely death brings tears to my eyes, and the heart bleeds a little. His laugh will always ring in my ears. “Goodbye Carl,” till we meet again...



Photograph - Courtesy of Mr. Cliff Giles, Albuquerque, NM



Photograph - Courtesy of Prof. Cui Meng, Tsinghua University, Beijing

Beijing, 1993 (left) and October 2010 on Carl's last “around-the-world” speaking tour





**D**r. Giri has over 35 years of work experience in the general field of electromagnetic theory and its applications in NEMP (Nuclear Electromagnetic Pulse), HPM (High-Power Microwaves), Lightning, and UWB (Ultra Wideband). A complete description of his academic training and work experience may be seen at his website: [www.dvgiri.com](http://www.dvgiri.com)

He obtained the B.Sc., Mysore University, India, (1964), B.E., M.E., Indian Institute of Science, (1967) (1969), M.S., Ph.D., Harvard University, (1973) (1975), Certificate, Harvard Introduction to Business Program, (1981).

Since 1984, he is a self-employed consultant doing business as Pro-Tech, in Alamo, CA, performing R&D work

for U.S. Government and Industry. He is also an Adjunct Professor in the Dept. of ECE, University of New Mexico, Albuquerque, NM. Dr. Giri has taught graduate and undergraduate courses in the Dept. of EECS, University of California, Berkeley campus. From May 1978 to September 1984, he was a staff scientist at LuTech, Inc., in Berkeley, CA. Prior to his association with LuTech, Inc., Dr. Giri was a Research Associate for the National Research Council at the Air Force Research Laboratory (AFRL), Kirtland AFB, New Mexico, where he conducted research in EMP and other aspects of electromagnetic theory.

Dr. Giri is a **LIFE FELLOW of the Institute of Electrical and Electronic Engineers (IEEE)**, a Charter Member of the Electromagnetics Society, and Member of Commission B, URSI and International Vice-Chairman of Commission E, URSI. He has served on the editorial board of the Journal of Electromagnetics, published by the Electromagnetics Society. He has also served as an Associate Editor for the IEEE Transactions on Electromagnetic Compatibility. He was elected to the grade of FELLOW by the awards committee of Summa Foundation in 1994 for his contributions to EMP simulator design and HPM antenna design. He has coauthored a book titled **High-Power Microwave Systems and Effects** published by Taylor and Francis in 1994. He is a co-recipient of the IEEE Antennas and Propagation Society's **2006 John Kraus Antenna Award**. His second book titled **High-Power Electromagnetic Radiators: Nonlethal Weapons and Other Applications** has been published by Harvard University Press in 2004. He is a co-editor of a book titled **Ultra-Wideband Short Pulse Electromagnetics 9**, published by Springer, 2010. He has also published over 100 papers, reports etc.

*It is not about the destination,  
all about the Journey ...*