CURRICULUM VITAE for Lembit Sihver

1. PERSONAL DATA

1.1 Family name: Sihver
1.2 First name: Lembit
1.3 Sex: Male
1.5 Nationality: Swedish

2. DEGREES AND ASSESSMENTS

2.1 Academic degrees

July 1, 1986: MSc in Chemical Engineering, Royal Institute of Technology (KTH), Stockholm, Sweden.
February 22, 1988: Licentiate of Technology in Nuclear Chemistry/Nuclear Physics, Uppsala University, Uppsala, Sweden.
December 7, 1990: Dr. of Technology (PhD) in Nuclear Chemistry/Nuclear Physics, Uppsala University.

2.2 Conferment of the title of Associate Professor (Docent)

May 29, 1997: Associate Professor (Docent) of Nuclear Chemistry at KTH.

3. POSITIONS

3.1 Present position, appointed November 2005: Full Professor of Nuclear Science and Engineering, Head of Nuclear Science and Engineering Group, Nuclear Engineering, Applied Physics, Chalmers University of Technology, SE-412 96 Gothenburg, Sweden.
Telephone: +46 - (0)31 - 772 2921, Mobile: +46 - (0)73 - 079 4223, Fax: +46 - (0)31 - 772 2931.
3.2 Present position, appointed February 1, 2003: Adjunct Research Professor of Physics, Roanoke College, 221 College Lane, Salem, Virginia, USA.

3.3 Recent positions as a visiting scientist

March - June 2008: Japan Society for Promotion of Sciences **(**JSPS) Short Term Fellow at the Japan Atomic Energy Agency (JAEA), Tokai-mura, Japan.
December 2007 - January 2008: Visiting Professor at the German Aerospace Institute (DLR), Cologne, Germany.
March - April 2007: Visiting Professor at the Heavy Ion Medical Accelerator in Chiba (HIMAC), National Institute of Radiological Sciences (NIRS), Chiba, Japan.
February 2007: Visiting Professor at the University of Tokyo, Tokyo, Japan.
January 2007: Visiting Professor at JAEA.
August - September 2006: Visiting Professor at DLR.
March - May 2006: JSPS Short Term Fellow at JAEA.
January - March 2004: JSPS Short Term Fellow at HIMAC, NIRS.

3.4 Previous periods of employment

March 2002 - October 2005: Full Professor of Nuclear Chemistry, Head of Nuclear Science and Engineering Group, Nuclear Chemistry, Chalmers University of Technology.
April 2000 - February 2002: Senior Specialist of Fuel Reliability and Product Group Leader of Fuel Integrity at the staff of Fuel Services, Nuclear Services, Westinghouse Atom AB, Sweden. See also below.
July 1995 - March 2000: Technical Specialist of Fuel Integrity and Project Manager of Fuel Reliability at the staff of Project and Mechanical Construction, Fuel Division, ABB Atom AB/Westinghouse Atom AB, Sweden. My work at ABB/Westinghouse Atom AB included mainly international and confidential

company research and development in collaboration with different universities and research institutes all around the world, but also business management and custom support. I was responsible for:

- organizing international research and development programs in collaboration with the customers
- being a teacher for many courses given to the customers
- transferring knowledge to younger colleagues, writing, reviewing and approving reports, and acting as a supervisor, instructor and mentor for internal personnel and external undergraduate students
- keeping the company updated with the international development in the areas of nuclear services, fuel integrity and reliability
- keeping internal and external academic and industrial contacts in the area of interest
- maintaining contact with governmental bodies within my areas of responsibility
- marketing presentations of products and being a contact person for the customers.

April 1993 - July 1995: Visiting scientist in the Biophysics group at the "Gesellschaft für Schwerionenforschung" (GSI), Darmstadt, Germany. I developed and improved the beam transport models and the computer codes needed for the treatment planning system for radiotherapy using heavy ions at GSI. I also carefully verified the models against measurements performed at the heavy ion synchrotron at GSI, HIMAC and RIKEN in Japan. The models are incorporated into the treatment planning systems for radiotherapy at GSI, HIMAC and the Hyogo Ion Beam Medical Centre (HIBMC) in Japan and at Institute of Modern Physics (IMP), Lanzhou, China. In addition to the medical applications, the models are used in many different astrophysical applications, e.g. they are included in the code Cosmic Ray Effects on Microelectronic 1996 (CREME96), developed by Naval research Laboratory, VA, USA, and in different codes used by e.g. NASA for risk estimations in space.
January 1993 - March 1993: Researcher at the department of Neutron Research, Uppsala University.
April 1991 - December 1992: STA Scientific Fellow at NIRS. I developed the beam transport models and computer codes for the treatment planning system for radiotherapy using heavy ions at HIMAC which were under construction. I also verified the models experimentally.
December 1990 - March 1991: Researcher at the dept. of Neutron Research, Uppsala University.
July 1986 - December 1990: Graduate student and graduate research assistant at the dept. of Neutron Research, Uppsala University. The main research was experimental studies of target fragmentation in intermediate to ultra-relativistic heavy ion collisions. I supervised and tutored undergraduate and graduate students in USA and Sweden, and I was a member of the board for the Institute of Neutron Research at Uppsala University. I also worked as a graduate research assistant in Prof. W. D. Loveland's research group at Oregon State University (OSU), USA, during three summers and one fall, performed many experiments at different accelerator facilities around the world, and I attended the following summer schools.

- 1986: three months at CERN Summer School of Physics (Switzerland/France)
- 1988: the Summer Institute, School and Workshop on Relativistic Heavy Ion Physics at BNL (USA), and the Nordic Summer School in Nuclear Physics (Sweden)
- 1989: the International School of Physics "Enrico Fermi, Course CXII, Nuclear Collisions From the Mean Field into the Fragmentation Regime" (Italy)

August 1982 - July 1986: Undergraduate student at the School of Chemical Engineering, KTH. During the summer of 1983, I worked as a foreman at a warehouse. The summer of 1984, I had a position at a research laboratory, and during the summer of 1985, I worked as an undergraduate research assistant in Prof. W. D. Loveland's nuclear chemistry research group at OSU. I evaluated experimental data and took part in experiments performed at the Lawrence Berkeley Laboratory (LBL), Berkeley, CA, USA.
June 1981 - July 1982: Military Service, second lieutenant in the anti-aircraft in Sweden.

During the spring of 1982, I also worked as a teacher, both at junior and senior high schools in Sundsvall. I mainly taught scientific subjects, but also languages, history, social science, etc. I had also positions as a teacher of computer science, etc. for different companies during this period.
Before 1981: Many different part time positions as a teacher of computer sciences for companies and of natural sciences etc. at senior and junior high schools, and as a porter, news paper deliverer, mail man, etc.

4. OVERVIEW OF CURRENT SCIENTIFIC PROFILE

My research is very international through collaborations with researchers at different research institutes, universities and companies in Japan, USA, China, Russia and Europe. I therefore spend a lot of time with my colleagues all around the world. My current research can be divided into the following main areas.

4.1 Heavy ion Physics and Radiation Shielding

We are participating in measurements of projectile and target fragmentation cross sections, and fragment emission angular distributions at different accelerators in Japan, USA and Russia. My research group is mainly responsible for analysis of the measured data and for improving, benchmarking and validating different particle and transport models and codes which simulate the transport of particles and heavy ions in different materials. The most important work in this field is the development and improvement of the Particle and Heavy Ion Transport code System (PHITS), which is performed in close collaboration with JAEA, Research organization for Information Science and Technology (RIST) and the High Energy Accelerator Research Organization (KEK) in Japan. I am official technical advisor and code developer of PHITS http://phits.jaea.go.jp/index.html. The main goals for our experimental and theoretical programs are risk assessments and improvement of the radiation shielding for personnel on high altitude flights, and for astronauts on long term space missions outside the earth's protective magnetosphere. We are also involved in improvement of the treatment planning codes when using heavy charge particles for radiotherapy and I am Task Leader (TL) for many tasks in the EU FP-7 Program "Early and late health risks to normal/healthy tissues from the use of existing and emerging techniques for radiation therapy" (ALLEGRO).

4.2 Space Dosimetry

I am Work Package Leader (WPL) for simulations, analysis and evaluations of four ESA supported experiments at the International Space Station (ISS): MATROSHKA MATROSHKA-R, ALTEA, and ALTCRISS:

a. The MATROSHKA facility is used to determine the relations between measurable absorbed doses and the required tissue absorbed doses in a realistic human phantom located both inside and outside the ISS.
b. The MATROSHKA-R is a spherical tissue equivalent phantom used to determine the relations between measurable absorbed doses and the required tissue absorbed doses inside the ISS.
c. The ALTEA system at the ISS is designed to extend our understanding of the effects of ionizing radiation on the Central Nerve System (CNS) and to develop "CNS-Optimized" radiation shielding for use aboard the ISS and in future exploration class.
d. The ALTCRISS project is performing a long term monitoring of the radiation environment on board the ISS.

I am also Work Package Leader (WPL) for the experimental and calculated 3D radiation model in the EU FP-7 Program "Human Model MATROSHKA for Radiation Exposure Determination of Astronauts" (HAMLET). During 2002-2006 I belonged to two NASA Space Radiation Shielding Consortia; one consortium which was responsible for the development of particle and heavy ion transport codes for simulation of the radiation environment for personnel on ISS and on future manned interplanetary

missions, and the other which was performing accelerator based measurements for benchmarking of the developed particle and heavy ion transport codes. The first consortium was lead by Prof. Larry Townsend, University of Tennessee, TN, USA and the other by Dr. Jack Miller at Lawrence Berkeley National Laboratory, CA, USA.

4.3 Flight Dosimetry

This work is performed in close collaboration with DLR in Germany. By using particle and heavy ion transport codes in comparisons with on ground and on flight measurements, semi-empirical functions to calculate particle fluxes and dose rates as a function of altitude, solar activity and geomagnetic latitude for galactic cosmic rays and solar particle events are derived. These functions are used to calculate the total dose for crew members on any flight for which the departure and arrival time, and flight profiles are known. I have a similar collaboration with JAEA in Japan and we are also performing in-flight measurements.

4.4 Development of Detector Systems for Dose Reduction at Nuclear Power Plants

New detector systems for detection of fuel and control rod failures are developed. This work is mainly performed in collaboration with Forsmarks Kraft AB, Sweden and Kernkraftwerk Leibstadt (KKL), Switzerland.

4.5 Severe Nuclear Accidents

I am a member of SARNET which is a network of excellence federating European research on core meltdown reactor accidents, and I am planning several new programs concerning research about severe nuclear accidents.

5. TEACHING AND SUPERVISION

1997-2002: I developed a 7.5 credit points PhD level course about the nuclear fuel cycle at KTH. I was also the responsible lecturer and examiner for this course. At ABB Atom/ Westinghouse Atom AB, I supervised external Master Students and internal personnel and I developed course material and held courses both for customers and our own personnel.

2002-2007: Until 2005, I was a lecturer and an examiner for a 6 credit point graduate course in nuclear chemistry. Since 2007 I am a lecturer and co-developer of a master course in nuclear engineering, and co-developer and lecturer of a 7.5 credit points course called “From Higgs Boson to Supernova”, which is held at the University of Gothenburg.

Since 2002, I have supervised and examined four PhD students (Marco Giacomelli, 2004, Henrik Glänneskog, 2005, Chiara La Tessa, 2007, and Davide Mancusi, 2008), two licentiate students (Chiara La Tessa, 2005, and Davide Mancusi, 2006) and 13 Master thesis students. Currently, I have 2 PhD students (Katarina Gustafsson and Irina Larsson). In addition to that, I have supervised two other licentiate/PhD students during 2005-2008 (Torbjörn Stenström and Daniel Matthiä), and I supervised one intern researcher (Dipl. Bio. Britta Langen) from the German Aerospace Center, Cologne, Germany, January – March, 2009.

Opponent on Licentiate Thesis by Ingvar Mattson, Uppsala University, 2000.

Opponent on PhD Thesis by Tore Ersmark, KTH, 2006.

6. PEDAGOGICAL EDUCATION

1981 - 1982, I did my military service as second lieutenant in the anti-aircraft and I was responsible for the education and training of my platoon. I therefore fulfilled several military pedagogical courses. During my whole professional career, I have taken part in many different courses in pedagogic and presentation techniques, given by different private schools and organizations. I have followed several language courses in English and German, including “Teaching in English” at Chalmers University of Technology.

7. PUBLICATIONS AND PRESENTATIONS

No. of papers published in peer-reviewed international scientific journals: 59
No. of papers submitted to peer-reviewed international scientific journals: 14
No. of articles and abstracts published in international conference proceedings: 92
No. of laboratory reports: 34
No. of European Commission Framework Reports: 1
No. of propriority/confidential company reports: 56
No. of ESA IBER Reports: 1
No. of patents: 5
No. of oral and poster presentations at international meetings and conferences: 135
(40 were "Invited Talks" by me)

8. MISCELLANEOUS

My research group at Chalmers has a Memorandum of Understanding (MOU) on research exchange with the Institute of Modern Physics (IMP), Lanzhou, China, and a bilateral Erasmus agreement on exchange of teaching staff and students with Prof. Dr. Riza Ogul and his research group at Selcuk University, Kampus, Konya, Turkey. Since 2006 I am an executive member of the board for JSPS Alumni Club in Sweden, and I belong to the Swedish Expert Group for Zr in the Nuclear Industry. I am a frequently solicited speaker at the COSPAR Scientific Assembly, and referee to Adv. Space Res., Medical Physics, Radiation & Environmental Biophysics, Physics Scripta, Zeitschrift für Medizinische Physiks, NIM B, New Journal of Physics, and several IEEE Nuclear Science Symposiums. I also belong to a review committee of the 3-D Monte Carlo GEometry ANd Tracking 4 (GEANT4) particle and heavy ion code package and I belong to the ESA Topical Team on New Developments in Space Radiation Biology and Dosimetry (TT-IBER). I am a COSPAR Associate, and I have been a session chair at many large International conferences, e.g. COSPAR 2004 (Paris, France), COSPAR 2006 (Beijing, China), COSPAR 2008 (Montreal, Canada), 16th IAA Humans in Space Symposium (Beijing, 2007). I belong to the 2009 IEEE Aerospace Conference Technical Program Committee and am organizing and chairing the Track 2 session 2.13 "Space Radiation Shielding and Transport Calculations" at the IEEE Aerospace Conference, March 7-14, 2009 in Big Sky, MT, USA. I also belong to the Scientific Committee for the session "Psychical and Biological Models" at COSPAR 2010 in Bremen, Germany. I evaluated the application for lecturer (lector) of Reactor Physics at KTH and the promotion of Dr. Janne Wallennius to Professor, 2008. I am nominated to be included in 2010 Edition of the globally distributed Marquis' "Who's Who in the World".

9. OWN CONSULTANT COMPANY

Since 2002, I am the president of "LS Nuclear Science and Technology". The main businesses are consultancy and translation work.