

Minutes of the IUVSTA Education Committee
ECM 98
Deutschordenhaus Schloss, Gumpoldskirchen, Austria
Saturday, 1 October 2005

1. The chairman of the education committee, Dr Laszlo Kover, opened the meeting at 14.00.
2. Members present: Laszlo Kover (chair), David Sykes (secretary), Ugo Valbusa, J. Avila, M-G Barthes, M. Jenko, Vladimir Matolin, Fabio Mazzolini, Pedro Nascente, Nikola Radic, Ron Reid, Janez Setina, Sandor Bohatka and Maria-Carmen Asensio. Observers present were: Roger Degryse, Alireza Moshfegh, Marek Szymonski, H-J Guntherodt, John Grant, Christoph Eisenmenger-Sittner, Pierre Strubin, Ki-Soo Sohn, Wolfgang Schwarz and Masatoshi Ono.
3. The agenda, which had been circulated previously, was adopted.
4. The minutes of the previous meeting were approved.
5. **Short Courses:** Dr Kover asked those members who had been involved in running recent short course to share their experiences. Ron Reid reported that he had been involved with one of the short courses held during EVC9; his feeling was that the courses went well attracting a mix of students although his was the only course to make use of IUVSTA material. It was noted that only two participants were registered a few weeks before the meeting but, in the end, a total of twenty five attended. It was accepted that there was a need to have the attendees registered well in advance of the courses. Dr Kover commented that the visual aids were being refreshed and new topics were being developed. John Grant reported that he had run two short courses at ECASIA, a two day module on XPS and a one day module on data processing. Attendees ranged from new to experienced users. He expressed the opinion that it was an advantage to hold courses alongside exhibitions as these allowed practical demonstrations to be conducted. Dr Grant had not made use of IUVSTA visual aids.
6. **Technical Training Course Programme:** Nikola Radic, presented a report on the Technical Training Course Programme, Appendix 1.

The situation regarding the Pakistan Vacuum Society was discussed and it was agreed that the chairman should write to the Society reminding them of the agreement to hold a training course consistent with IUVSTA Guidelines or to return the funding.

It was noted that the Croatian Vacuum Society had returned the grant approved at ECM-94 as the proposed course had not taken place. This was because the original plan had been to use IUSTA modules but it was found that the content was obsolete and not useful. Some modules had been translated and it was hoped that the course would eventually take place.

Two applications for new courses had been received, one from Poland, Appendix 2, and one from Hungary, Appendix 3. The proposals were discussed. Prof Valbusa questioned the budget of the Hungarian proposal, in particular the provision of travel support whilst still charging course fees asking why were the fees not reduced. He suggested that the budget be clarified as fixed costs were not identified. MG Barthes commented that grants given for travel and accommodation should have an upper limit and that the IUVSTA funding was not for infrastructure costs, which were the responsibility of local societies, but to increase participation in the courses. Dr Kover moved that both courses should be supported and this was accepted unanimously.

Dr Reid asked whether or not continuing courses should receive IUVSTA funding. Dr Kover replied that it was not the intention to provide continuing financial support but the Union could endorse continuing courses at no cost. Dr Reid commented that a clear policy needed to be established and asked Dr Kover to redraft the guidelines accordingly.

Dr Kover announced that Dr. Radic was stepping down as Technical Training Coordinator and thanked him for work; he asked the committee to endorse the appointment of Christoph Eisenmenger-Sittner as the new Technical Training Coordinator.

7. **Education Web Site:** Dr Kover reported that work had started and that he had produced a list of useful links that could go on the site and had sent this to Angus Rocket. He also reported that he had had correspondence about copyright issues. He noted that he had asked Vladimir Matolin to look at how the web site could be organised and it was clear that this needed further discussion as the legal position was not clear. John Grant reported that he had asked AVS to replace the broken link to the IUVSTA site.

8. **Visual Aids Programme:** A report had been received from John Robins who had made little progress because of his other commitments. Only Module 5 was available for sale. The progress of other modules was discussed; Dr Kover noted that the whole process of producing a module was very slow, especially the refereeing process. It was suggested that there should be a time limit of one month for refereeing. Dr Kover commented that there was a need for a standard format for authors to follow and that John Robins was using Module 5 as a template. M-G Barthes observed that previous attempts at imposing guidelines had failed as authors tended to do as they pleased. Dr Kover reported that the final version of Module 4 had been prepared but was not yet refereed, Module 6 had been sent for refereeing but the review was not complete and changes were planned. No communication about Module 9 had been received in over a year. Dr Kover said he was looking for new authors and new topics and presented some of his ideas. Dr Reid returned the discussion to the refereeing process observing that a module completed two years ago was still awaiting comments. He asked what the refereeing process was for, commenting that, in his opinion, the referees should only be looking for mistakes.

9. **Building New Contacts:** Maria-Carmen Asensio reported on the activity of her subcommittee recapping on the work done in the last triennium. Monika Jenko reported that she had made some new contacts and hoped to have good news by the next ECM.

10. **Support of Activities in Member Societies:** Dr Kover asked Masatoshi Ono to report on activity in Japan. It was reported that there was a four day course, not related to IUVSTA, which had run for the last forty five years for which there was a text book in Japanese which might be translated.

11. **Any Other Business:** Dr Kover reported that two summer schools were due to take place; Dr Reid proposed that, in the interests of time, any discussion of this topic be deferred to the STD meeting which was due to follow the Education Committee meeting.

12. **Close:** Dr Kover closed the meeting at 15.55.

Appendix 1

IUVSTA Education Committee

ECM98, Gumpoldskirchen, Austria, September 30 – October 2, 2005

N. Radic: Technical Training Course Program, Report ECM97-ECM98

At the 15th IUVSTA General Meeting held in Venezia, June 30, 2004, it was decided to continue a Program of Technical Training Courses into the 2004-2007 triennium. A total sum of 15.000 CHF was allotted for this kind of activity in the Budget, to be spent at four grants of about equal amount. During previous triennium a total budget of 16.500 CHF was distributed to four approved TTCs. Two of the TTCs approved in the 2001-2004 triennium were extended into the 2005:

1) Pakistan Vacuum Society TTC – status

The last communication with Mr. Javaid A. Bhatti, Secretary General of the PVS, was on Jan 8, 2005 – he advised that in June 2005 the new PVS officials will be elected, and that planned training course under IUVSTA grant has been postponed till the end of yr. 2005. No replies have been received upon two recent inquiries (6 and 21 September, 2005) related to the status of the PVS TTC. Thus the status of the PVS TTC is unknown at the moment.

2) Croatian Vacuum Society TTC – status

Croatian VS obtained (at the ECM97) the extension of the IUVSTA TTC grant till the ECM98. Since the Croatian Vacuum Society has not organized the TSC until this date, the 3.600,00 CHF (transferred on Aug 31, 2004) has been refunded to the IUVSTA Treasury on September 27, 2005.

3) New Applications:

Together with the amount refunded by the Croatian VS, a New Educational Activities budget on September 30 amounts to 18.600,00 CHF. A Call for Applications for the IUVSTA TTC grants, to be considered at the ECM98, has been sent by e-mail on August 18, 2005. As of September 27, one Application has been received:

Application of the Polish Vacuum Society for the IUVSTA Technical Short Course Grant in 2005, submitted by Prof. M. Szymonski (in attachment). The Polish Vacuum Society successfully organized the TTC in Krakow, November 4-6, 2004, which was supported by the IUVSTA grant of 3.500,00 CHF. That amount was used for individual financial support of 27 out of 56 participants. The Organizers of the proposed TTC expects that the IUVSTA grant would allow enrollment at the Course of the people who otherwise would find it difficult to attend.

Dr. Nikola Radic, acting IUVSTA TTC Coordinator

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Appendix 2

Application of the Polish Vacuum Society for the IUUSTA Technical Short Course Grant in 2005

1. Course location: Jagiellonian University, Kraków, Poland; stand-alone course.
2. Tentative time: 27-29 October, 2005
3. Title and content of each course:

Part I: Basic physical processes relevant for vacuum technology (3+2 h):

Introduction:

- a concept of vacuum (definition, units, history)
- applications of the vacuum technology

Kinetic theory of gases, ideal gas, molecular incidence rate and cosine law, transport phenomena, thermal transportation, gas flow.

Physical and chemical phenomena at gas/solid interface:

- physisorption, chemisorption
- desorption rate
- cryotrapping
- diffusion of gases through solid (metal)
- interaction of particles with solid surface.

Part II: Methods and devices for obtaining vacuum (2 h):

Basics of pumping technology, mechanical vacuum pumps (rotary pump, dry pump), turbomolecular pump, diffusion pump, cryopump, getter pump, ion pump.

Part III: Vacuum measurements (4 h):

Vacuum measurement and gauges: manometers, thermocouple manometer, ionization gauges (hot, cold cathode), calibration of vacuum gauge.

Partial pressure measurements: mass spectrometry/spectroscopy, ion sources - ionisers, ion detectors, mass analysers (magnetic deflection, quadrupole mass filter, time-of-flight), data analysis.

Leak detection: leak rate, leak detection techniques, mass spectrometer leak detection.

Part IV: Applications of vacuum in industry (3 h):

Practical examples of vacuum applications in various industrial processes selected and reviewed by representatives of the Polish vacuum companies.

4. Goals of the course:

The Technical Short Course is offered mainly to Polish technicians, production engineers, junior researchers and students responsible for safe handling/operation and maintenance of vacuum equipment/systems in the local industries and laboratories of educational and research institutions. The Course should significantly enhance the knowledge and understanding of basic physical processes relevant for vacuum technology, provide practical knowledge required for every day operation of vacuum devices and measurements of vacuum, as well as introduce the trainees to selected

aspects of technological processes requiring vacuum. Personal interaction between the course instructors and the trainees shall help in establishing long term contacts for future consulting and distribution of knowledge between academic circles, vacuum equipment producers and distributors, and vacuum practical users. The Course will end with test evaluation of the participant progress. The participants passing the required evaluation limit will be entitled for receiving the course certificate issued by the Polish Vacuum Society.

5. Teachers (all lectures will be in Polish):

- Prof. Andrzej Hałas – Wrocław University of Technology, Wrocław
- Prof. Stanisław Hałas – Maria Curie-Skłodowska University, Lublin
- Dr. Piotr Szwemin – Warsaw University of Technology, Warszawa
- Dr. Janusz Budzioch – Prevac - Vacuum Company
- Maria Tymieniecka – COMEF – Vacuum Company
- Ryszard Tyrankiewicz – ŻART – Vacuum Company

6. Expected educational and job level of students:

- a) educational level: at least with senior high school education
- b) job level: technician

7. Expected average number of students per course: min. 30

8. Finances:

Cost of Short Technical Course in CHF:

- a) Total cost of STC: **7 200 CHF**,
- b) Expected total amount of IUVESTA support: **3500 CHF** (IUVESTA grant),
- c) STC participant regular fee without IUVESTA support (including full board accommodation per one participant): 250 CHF,
- d) Full board accommodation cost (per participant): 190 CHF,
- e) Travel costs for one participant (estimated value): 35 CHF,
- f) Proposed IUVESTA financial support towards participant accommodation and travel : **140 CHF** per person.
- g) Expected number of IUVESTA supported participants: 25 persons.

On behalf of the Polish Vacuum Society:

/-/ Prof. Marek Szymonski,
President, PVS Executive Board

Appendix 3**TECHNICAL SHORT COURSE IN HUNGARY
APPLICATION SUBMITTED TO IUVSTA ECM-98 FOR GRANT**

1. LOCATION AND DATE:

Institute of Nuclear Research (ATOMKI), Bem ter 18/C, 4026 Debrecen, Hungary
5 days, tentative date: 26th – 30th June 2006

2. TITLE AND CONTENT:

Training Course on Practical Vacuum Technique

1. Brief overview on the history and applications of vacuum technique
2. Fundamentals of the kinetic theory of gases
 - Model of the ideal gas
 - Distribution of velocities
 - Pressure
 - Wall flux density
 - Even distribution of energy
 - Mean free path, collision rate
3. Transport phenomena
 - Diffusion
 - Internal friction in gases
 - Thermal conduction in gases
4. Interaction of gases and condensed matter
 - Possible sources of gases in a vacuum vessel
 - Vapours, evaporation, condensation
 - Sorption phenomena
 - Permeation
5. Total pressure gauges
 - Mechanical vacuum gauges
 - Viscosity vacuum gauge
 - Liquid level manometers
 - Thermal conductivity vacuum gauges
 - Ionisation vacuum gauges (hot and cold cathode types)
6. Partial pressure measurement (mass spectrometers)
 - Brief overview on the different types
 - Practical aspects, residual gas analysis
7. Leak detection methods, apparatus and practice
8. Flow of gases
 - Gas flow, pumping speed, throughput
 - Flow resistance and conductivity, effective pumping speed
9. Flow through apertures and pipes, pump-down time of the recipient
10. Pumps (with special attention to oil-sealed and dry techniques)
 - Positive displacement pumps

1. alternating displacement pumps
 2. rotary displacement pumps
 - Fluid entrainment pumps
 - Molecular pumps
 - Sorption pumps
 - Cryopumps
11. Vacuum systems
- Examples of real systems for different pressure ranges
 - Hints on operation
12. Technical aspects
- Materials used in vacuum technique
 - Accessories
 - Junctions, seals, feedthroughs
 - Cleaning
13. Thin films
- Film preparation
 1. Physical vapour deposition (evaporation, sputtering, laser ablation, MBE)
 2. Chemical vapour deposition
 3. Film formation and structure
 - Mechanical, electric, magnetic and optical properties of thin films
 - Characterization of solid surfaces and thin films (mostly by electron and ion beams)
 - film thickness measurements, Electron Microscopy - SEM, TEM, Electron Spectroscopy – XPS, UPS, AES, Reflected Electron Energy-loss Spectroscopy – REELS, Elastic Peak Electron Spectroscopy – EPES, Secondary Ion/Neutral Mass Spectrometry (SIMS, SNMS), Scanning Tunnelling Microscopy (STM), X-ray diffraction), Rutherford Backscattering Spectrometry – RBS, Elastic Recoil Spectrometry – ERS, Medium-Energy Ion Scattering – MEIS, Ion Scattering Spectroscopy - ISS
 - Mechanical, electric, magnetic and optical properties of thin films
14. Laboratory practice
- Calculation of basic quantities (pumping speed required in a system, pipe dimensions, etc).
 - Demonstration of high vacuum and ultrahigh vacuum pumps, accessories and systems; a quadrupole mass spectrometer; an electron spectrometer system; thin film production with magnetron sputtering; SIMS, SNMS; TEM, STM; X-ray diffraction.
 - Leak detection with Pirani and ionisation gauge, and mass spectrometer.

Theoretical basis of the related phenomena (chapter 1-4) will be treated in short, knowledge essential in production and laboratory practice will be discussed in detail.

3. INTENT OF THE COURSE:

Further education and training of technicians, postgraduate students, engineers and scientists working in vacuum-related fields.

Stand-alone course.

4. TEACHERS AND LANGUAGE:

Dr. Sandor Bohatka, senior scientist, ATOMKI, president of Vacuum Physics Division of R. Eotvos Physical Society (REPS)

Dr. Gabor Langer, senior scientist, Solid State Physics Department of Debrecen University

Dr. Dezso Varga, senior scientist, ATOMKI

Language: Hungarian

5. EXPECTED EDUCATIONAL AND JOB LEVEL OF STUDENTS:

High school, college and university graduates.

Technicians, engineers postgraduate students and scientists working in production, research and teaching.

6. EXPECTED AVERAGE NUMBER OF STUDENTS: 25 (5 local and 20 from outside of Debrecen), Hungarian-speaking students from the neighbouring countries are also accepted.

7. FINANCES:

Cost of the course: 8200,- CHF

Sources:

support: IUVSTA 3500,- CHF

R. Eotvos Physical Society 500,- CHF

from participants: 4200,- CHF

Expenses of participants (per person):

short course fee: 120,- CHF

accommodation: 4x55,- CHF 220,- CHF

travel: 40,- CHF

Use of support: either sort of expenses, but not exceeding 260,- CHF/person

Organiser: Vacuum Physics Division of Roland Eotvos Physical Society (REPS), Fő u. 68, 1027 Budapest, Hungary.

Students get a certificate issued by Roland Eotvos Physical Society, member of the Federation of Technical and Scientific Societies.

Debrecen, 28 September 2005

Sándor Bohátka
Alt. Councillor, Hungary
President of Vacuum Phys. Dep., REPS