11th SolarPACES International Symposium on Concentrated Solar Power and Chemical Energy Technologies

September 4-6, 2002
Zurich, Switzerland

Towards Clean and Sustainable Energy Utilization

Program and Registration

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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PAUL SCHERRER INSTITUT
PSI

Mission and Scope

This international conference is the biennial event of the International Energy Agency's ***SolarPACES Program*** (Solar Power and Chemical Energy Systems). It provides the largest and most comprehensive forum for the latest technological advances in the field of solar thermal electricity production as well as on solar chemical conversion. It will bring you up-to-date on project developments while striving to promote international R&D collaborations. The Symposium attendees will include engineers, manufacturers, contractors, scientists, researchers, educators, students, economists, industry representatives, and policymakers. All are attracted by this unique opportunity to learn about new and improved technologies, discover emerging products, designs, and software, and attend workshops and tours. There is no better way to learn about the state-of-the-art of concentrated solar technologies while discussing strategies and future directions towards clean and sustainable energy utilization.

Organization and Sponsorship

ETH Swiss Federal Institute of Technology
PSI Paul Scherrer Institut
SFOE Swiss Federal Office of Energy
SolarPACES Program of the International Energy Agency

Chairman: Aldo Steinfeld, ETH – Swiss Federal Institute of Technology / Paul Scherrer Institut.
Co-chairman: Paul Kesselring, on behalf of the SFOE – Swiss Federal Office of Energy.

Scientific Committee

M. Abdel-Rahman, NREA-New and Renewable Energy Authority, Egypt
J. Blanco, CIEMAT-Centro de Investigaciones Energéticas Medioambientales y Tecnológicas, Spain
G. Calzaferri, University of Bern, Switzerland
M. Epstein, Weizmann Institute of Science, Israel
D. Favrat, EPFL-Ecole Polytechnique Federale de Lausanne, Switzerland
G. Flamant, CNRS-Centre National de la Recherche Scientifique, France
K. Funken, Deutsches Zentrum für Luft- und Raumfahrt e.V., Germany
M. Geyer, SolarPACES
A. Hintermann, Swiss Federal Office of Energy, Switzerland
J. Huacuz, Instituto de Investigaciones Eléctricas, Mexico
R. Judd, Advantica Technologies Ltd, UK
V. Kirillov, Boreskov Institute of Catalysts, Russia
A. Kribus, Weizmann Institute of Science, Israel
A. Lewandowski, National Renewable Energy Laboratory, USA
N. Lior, University of Pennsylvania, USA
A. Luzzi, Australian National University, Australia
T. Mancini, Sandia National Laboratories, USA
W. Meike, Northern Territory Centre for Energy Research, Australia
J. Murray, CNRS-Centre National de la Recherche Scientifique, France
R. Palumbo, Paul Scherrer Institute, Switzerland
D. Poulikakos, ETH-Swiss Federal Inst. of Technology, Switzerland
A. Reller, University of Augsburg, Germany
M. Romero, CIEMAT-Centro de Investigaciones Energéticas Medioambientales y Tecnológicas, Spain
P. Schild, Research Directorate-General, European Commission
W. Stein, SCIRO-Commonwealth Scientific and Industrial Research Organisation, Australia
R. Tamme, Deutsches Zentrum für Luft- und Raumfahrt, Germany
L. Van Heerden, Eskom Enterprises (Pty) Ltd, South Africa
A. Wokaun, Paul Scherrer Institut, Switzerland
Y. Zvirin, Technion - Israel Institute of Technology, Israel

Schedule at a Glance

Registration:

Tuesday, September 3, 16:00-18:00
Wednesday, September 4, 8:00-9:00

Wednesday, Sept. 4	Thursday, Sept. 5	Friday, Sept. 6
9:00-10:40 Opening Plenary Welcome Address and Keynote Presentations	*9:00-10:40 Plenary Session* Solar Power	*9:00-10:40 Plenary Session* Solar Chemistry
10:40-11:00 Coffee Break	*10:40-11:00 Coffee Break*	*10:40-11:00 Coffee Break*
11:00-12:30 Parallel Sessions Solar Trough Technology / Solar Materials	*11:00-12:30 Parallel Sessions* Market and Policy Aspects / Solar Fuels	*11:00-12:30 Closing Plenary* • Summary & Outlook • Awards
12:30-14:00 Lunch Break	*12:30-14:00 Lunch Break*	*12:30-14:00 Lunch Break*
14:00-15:30 Parallel Sessions Solar Tower Technology / Solar Detoxification	*14:00-15:30 Parallel Sessions* Solar Thermal Storage and Hybrid Systems / Diagnostics, Control, and Modeling Tools	*14:00-17:00 Afternoon Program* • Technical Tours • Swiss Hydrogen Association Session • Excursions
15:30-18:30	*15:30-16:00 Coffee Break*	
Poster Presentations and Snack Dinner	*16:00-17:30 Parallel Sessions* Dishes, Heliostats, and Concentrators / Emerging Concepts	
	19:00 Banquet	

Conference Language: English

Parabolic Trough Technology

Program and Registration

Tuesday, September 3, 2002

16:00-18:00	*Registration*

Wednesday, September 4, 2002

8:00-9:00	*Registration*
9:00-9:20	*Opening Plenary*

Welcome Addresses

- Aldo Steinfeld, Chairman of the SolarPACES Symposium 2002
- Ralph Eichler, Director of the Paul Scherrer Institute
- Ulrich Suter, Vice President for Research of the ETH-Swiss Federal Institute of Technology Zurich

9:20-10:40	*Keynotes*

Chairman: Paul Kesselring, Switzerland

- Hans Luzius Schmid
  Deputy Director, Swiss Federal Office of Energy, Switzerland
  "SwissEnergy: The Programme to Reach our Energy and Climate Policy Objectives"
- Craig Tyner
  Chairman SolarPACES Program, Sandia National Laboratories, USA
  "Concentrating Solar Power: Technology for a Better Future"
- Eberhard Jochem
  Centre for Energy Policy and Economics
  ETH-Swiss Federal Institute of Technology Zurich, Switzerland
  "Energy, Sustainability and Development – The Challenge of the 21th Century"

10:40-11:00	*Coffee Break*
11:00-12:30	*Parallel Sessions*

Solar Trough Technology

Chairman: Michael Geyer, SolarPACES

- M. Geyer, E. Lüpfert*, R. Osuna, A. Esteban, W. Schiel, A. Schweitzer, E. Zarza, P. Nava, J. Langenkamp, E. Mandelberg
  *DLR Plataforma Solar de Almeria, Spain
  "EuroTrough - Parabolic Trough Collector Family Developed and Qualified for Cost Efficient Solar Power Generation"

- E. Zarza*, L. Valenzuela, J. León, K. Hennecke, M. Eck, H.Weyers, M. Eickhoff
  *CIEMAT – Plataforma Solar de Almeria, Spain
  "Direct Steam Generation in Parabolic Troughs Final Results and Conclusions of the DISS Project"

- O. Goebel*, A. Stryk
  *Lahmeyer International GmbH, Germany
  "Parabolic Trough Collector with Foldable Reflector FC1: Design, Test Programme and Experiences"

- R. Aringhoff*, M. Geyer, U. Herrmann, R. Kistner, P. Nava, R. Osuna
  *Milenio Solar SA, Aguadulce, Spain
  "AndaSol - 50MW Solar Plants with 9 Hour Storage for Southern Spain"

- G. Brakmann*, H. Ernst; G. Somani
  *Fichtner Solar, Stuttgart, Germany
  "ISCC Mathania - Integrated Solar Combined Cycle Power Plant in India"

- V. Flores*, R. Almanza
  *UNAM, Ciudad Universitaria, Coyoacán, México
  "Direct Steam Generation in Parabolic Trough Concentrators with Bimetallic Receivers"

Solar Materials

Chairman: Gilles Flamant, CNRS-Odeillo, France

- A. Meier*, E. Bonaldi, G. M. Cella, W. Lipinski, D. Wuillemin, R. Palumbo
  *Paul Scherrer Institute, Switzerland
  "Design and Experimental Investigation of a Horizontal Rotary Reactor for the Solar Thermal Production of Lime"

- K. Hennecke*, J. Kötter, O. Michel, D. Peric
  *DLR Köln, Germany
  "Solar Process Steam Generation for the Production of Porous Concrete"

- T. Fend*, B. Hoffschmidt, R. Pitz-Paal, O. Reutter, P. Rietbrock
  *DLR Köln, Germany
  "Porous Materials as Open Volumetric Solar Receivers: Experimental Determination of Thermophysical and Heat Transfer Properties"

- J.P. Murray*, G. Flamant, G. Olalde
  *IMP-CNRS, Odeillo, Font-Romeu Cedex, France
  "Solar Production of Solar-Grade PV Silicon"

- M. Roeb*, N. Monnerie, R. Schäfer, H. Oezbey, K.-H. Funken
  *DLR Köln, Germany
  "Solar Recycling of Used Beverage Cans (UBC)"

- G. Flamant*, J. F. Robert, S. Marty, J. M. Gineste, J. Giral, B. Rivoire, D. Laplaze
  *IMP-CNRS, Odeillo, Font-Romeu Cedex, France
  "Methodology for Solar Reactor Scaling Up - The Fullerene Synthesis Case Study"

12:30-14:00 Lunch Break

14:00-15:30 Parallel Sessions

Solar Tower Technology

Chairman: Manuel Romero, CIEMAT – Plataforma Solar de Almeria, Spain

- C. Sugarmen, A. Ring, R. Buck*, R. Uhlig, M. Beuter, M. Marcos, V. Fernandez
  *DLR Stuttgart, Germany
  "Solar-Hybrid Gas Turbine Power System"
- P. Schwarzbözl*, M. Schmitz, R. Pitz-Paal, R. Buck
  *DLR Köln, Germany
  "Analysis of Solar Gas Turbine Systems with Pressurized Air Receivers (REFOS)"
- D. Mills*, P. Schramek, G. Morrison, B. Haynes, C. Dey, D. Buie, A. Imenes
  *University of Sydney, Australia
  "MTSA Prototype Array Project"
- B. Hoffschmidt*, V. Fernandez, R. Pitz-Paal, M. Romero, P. Stobbe, F. Téllez
  *DLR Köln, Germany
  "The Development Strategy of the HitRec Volumetric Receiver Technology – Up-Scaling from 200kWth via 3MWth up to 10MWel"
- M. J. Marcos*, M. Romero, S. Palero
  *CIEMAT Madrid, Spain
  "Analysis of Air Return Alternatives for CRS-Type Open Volumetric Receiver"
- R. Bertocchi*, J. Karni, A. Kribus
  *Weizmann Institute of Science, Rehovot, Israel
  "Experimental Evaluation of a Non-Isothermal High Temperature Solar Particle Receiver"

Solar Detoxification

Chairman: Julian Blanco, CIEMAT – Plataforma Solar de Almeria, Spain

- G. H. Rossetti, E. D. Albizzati, O. M. Alfano*
  *INTEC, Universidad Nacional del Litoral - CONICET, Santa Fe, Argentina
  "Degradation of an Organic Pollutant in a Nonconcentrating, Flat-Plate Solar Photoreactor, Using the Photo-Fenton Reaction"
- C. Sattler*, L. de Oliveira, M. Tzschirner, A. E. da Hora Machado
  *DLR Köln, Germany
  "Solar Photocatalytic Water Detoxification of Paper Mill Effluents"
- J. Kiwi, O. Enea*
  *UMR CNRS, University of Poitiers, Poitiers, France
  "Photo-Assisted Fenton Degradation of Model Textile Dyes by Fe/Nafion/Glass Fibers Under Solar Radiation"
- C. A. Arancibia-Bulnes, E. R. Bandala, C. A. Estrada*
  *UNAM, Temixco, Morelos, México
  "Radiation Absorption in Parabolic Trough and CPC Solar Photocatalytic Reactors"

- A. G. Rincón, P. Peringer, C. Pulgarin*
  *EPFL Lausanne, Switzerland
  "Effect of Different Physicochemical and Biological Parameters on E. Coli Inactivation Using TiO2"

- B. Sánchez*, R. Candal, A. I. Cardona, P. Ávila, M. Rebollar
  *CIEMAT Madrid, Spain
  "Comparison of Different Based-Tio2 Monoliths in the Photocatalytic Oxidation of Chlorinated Hydrocarbons"

15:30-18:30 ***Plenary Session***

Poster Presentations and Snack Dinner

SEGS Plant, California

Thursday, September 5, 2002

9:00-10:40 ***Plenary Session***

Solar Power

Chairman: Craig Tyner, Sandia National Laboratories, USA

Keynote

- Robert Pitz-Paal,
  Deutsches Zentrum für Luft- und Raumfahrt e.V., Germany
  "Preparing the Path for Competitive Concentrated Solar Power - R&D Achievements an Perspectives"

Solar Power Projects

- G. E. Cohen
  Duke Solar Energy, Raleigh, NC, USA
  "Solar Thermal Electric: A Vibrant Success Story"
- M. Romero,
  CIEMAT – Plataforma Solar de Almeria, Spain
  "Solar Power Projects in Spain"
- M. Geyer
  SolarPACES Executive Secretary
  "Concentrated Solar Power for Developing Countries - Progress and Questions to be Solved"
- Louis Van Heerden
  ESKOM, Johannesburg, South Africa
  "The feasiblity of a 100MW Solar-Only CSP Power Plant in South Africa"

10:40-11:00 ***Coffee Break***

11:00-12:30 ***Parallel Sessions***

Economic, Market and Policy Aspects

Chairman: Wolfgang Meike, NT Centre for Energy Research, Australia

- P. Schild
  EU Commission, DG Research, Bruxelles, Belgium
  "Solar Thermal Power: European Perspective"
- S. Hirschberg
  Paul Scherrer Institute, Switzerland
  "Approaches to Evaluating Sustainability of Energy Supply Options"
- M. Horn, H. Führing, J. Rheinländer*
  *ZSW Stuttgart,Germany
  "Economic Analysis of Integrated Solar Combined Cycle Power Projects A Sample Case: The Economic Feasibility of an ISCCS Power Plant in Egypt"
- J. Dersch*, M. Geyer, U. Herrmann, S. A. Jones, B. Kelly, R. Kistner, W. Ortmanns, R. Pitz-Paal, H. Price
  *DLR Köln, Germany

"Trough Integration Into Power Plants – A Study on the Performance and Economy of Integrated Solar Combined Cycle Systems"

- B. Varasteh
  Moshanir Power Engineering Consultants, Tehran ,Iran
  "The 430 Mwel ISCC Power Plant at Yazd, Iran – Project History and Thermodynamic Layout"

- V. Quaschning*, R. Kistner, W. Ortmanns
  *DLR – Plataforma Solar de Almería, Spain
  "Estimation of the Optimal Parabolic Trough Field Size Depending on Direct Normal Irradiance Variations"

Solar Fuels

Chairman: Armin Reller, University of Augsburg, Germany

- J. Dahl, K. Buechler, A. Weimer*
  *University of Colorado, Boulder, USA
  "Rapid Solar-thermal Dissociation of Natural Gas in an Aerosol Flow Reactor"

- S. Kraeupl*, A. Steinfeld
  *Paul Scherrer Institute, Switzerland
  "The SynMet-Process for the Solar Co-Production of Zn and Syngas"

- M. Epstein*, K. Ehrensberger, A. Yogev
  *Weizmann Institute of Science, Rehovot, Israel
  "Ferro-Reduction of ZnO Using Concentrated Solar Energy"

- A. Kiyama, Y. Kondoh, T. Yokoyama, K. Shimizu, Y. Kitayama, T. Kodama*
  *Niigata University, Japan
  "New Catalytically-Activated Metal/Ceramic Foam Absorbers for Solar Reforming Receiver-Reactor"

- Y. Tamaura*, Y. Katayama, K. Uehara
  *Tokyo Institute of Technology, Japan
  "Solar-Hybrid Fuel Project in Japan and Soft Landing Scenario to Solar Energy Era"

- M. Forster
  Siemens Building Technologies AG, Männedorf, Switzerland
  "Theoretical Investigation of the System SnOx/Sn for the Thermochemical Storage of Solar Energy"

12:30-14:00 ***Lunch Break***

14:00-15:30 ***Parallel Sessions***

Solar Thermal Storage and Hybrid Systems

Chairman: Rainer Tamme, DLR-Stuttgart, Germany

- H. W. Fricker
  FC Consulting Rickenbach, Switzerland
  "Regenerative Thermal Storage in Atmospheric Air System Power Plants"

- D. Kearney*, B. Kelly, U. Herrmann, R. Cable, J. Pacheco, R. Mahoney, H. Price, D. Blake, P. Nava, N. Potrovitza
  *Kearney & Associates, Vashon, WA, USA
  "Engineering Aspects of a Molten Salt Heat Transfer Fluid in a Trough Solar Field"

- U. Herrmann*, B. Kelly, H. Price
  *Flabeg Solar International GmbH, Köln, Germany
  "Two-Tank Molten Salt Storage for Parabolic Trough Solar Power Plants"

- H. Hasuike*, K. Aiuchi, K. Yoshida, Y. Katayama, K. Iwamoto, Y. Tamaura
  *Institute of Applied Energy, Tokyo, Japan
  "CWM Preheating with Molten Salt Heat Storage System for Solar Coal Gasification"

- X. García-Casals
  Universidad Pontificia Comillas, Madrid, Spain
  "Part Load Performances of Oil Heaters for Hybrid Solar Thermal Power Plants"

- N. Aronis*, Prof. R. Leithner
  *Technical University Braunschweig, Germany
  "Solar Combined Cycle-SOLICO"

DIAGNOSTICS, CONTROL, AND MODELING TOOLS

Chairman: Allan Lewandowski, National Renewable Energy Laboratory, USA

- G. García*, A. Egea, M. Romero, J. A. Gázquez
  *CIEMAT – Plataforma Solar de Almeria, Spain
  "Implementing Wireless Communication In Heliostat Fields"

- A. Kribus*, I. Vishnevetsky, A. Yogev, T. Rubinov
  *Tel Aviv University, Israel
  "Closed Loop Control of Heliostats"

- J. Ballestrín*, R. Monterreal
  *CIEMAT – Plataforma Solar de Almeria, Spain
  "Hybrid Heat-Flux Measurement System for Solar Central Receiver Evaluation"

- S. Ulmer*, E. Lüpfert, M. Pfänder, R. Buck
  *DLR – Plataforma Solar de Almeria, Spain
  "Calibration Corrections of Solar Tower Flux Density Measurements"

- M. Eck*, E. Zarza
  *DLR Stuttgart, Germany
  "Assessment of Operation Modes for Direct Solar Steam Generation in Parabolic Troughs"

- J. Rheinländer*, T. Marquard-Möllenstedt, F. Gräter
  *ZSW, Stuttgart, Germany
  "Integration of Solar Direct Steam Generation into Solar Electric Power Systems - Advanced Commercial Software for Energy Performance Analysis"

15:30-16:00 ***Coffee Break***

16:00-17:30 ***Parallel Sessions***

DISHES, HELIOSTATS, TROUGHS, AND NOVEL CONCENTRATORS

Chairman: Thomas Mancini, Sandia National Laboratory, USA

- T. Keck, W. Schiel*, W. Reinalter, P. Heller
  *Schlaich Bergermann und Partner GbR, Stuttgart, Germany
  "EuroDish – an Innovative Dish/Stirling Concept"

- A Luzzi*, K. Lovegrove, S. Paitoonsurikarn, P. Siangsukone, G. Johnston, G. Burgess, W. Joe, G. Major
  *Australian National University, Australia
  "Paraboloidal Dish Solar Concentrator Investigations at the ANU – an update"

- T. Mancini, R. B. Diver, M. Mehos
  Sandia National Laboratories, USA
  "The Development of Dish Stirling Systems in the U.S."

- Ph. Schramek*, D. R. Mills
  *Solar Heat and Power – SHP; Starnberg, Germany
  "Heliostats for Maximum Ground Coverage"

- R. S. Sharma
  Solar Energy Centre, Ministry of Non-Conventional Energy Sources, New Delhi, India
  "Advanced Solar Collector Array Design for Parabolic Trough Based Solar Thermal Power Plant"

- A. Häberle*, H. Lerchenmüller, V. Wittwer, F. Trieb
  *PSE GmbH, Freiburg, Germany
  "The New Solarmundo Line Focussing Fresnel Collector. Optical and Thermal Performance and Cost Calculations"

Emerging Concepts

Chairman: Paul Kesselring, Switzerland

- C. Guesdon, T. Frey, A. Frei, M. Sturzenegger*
  *Paul Scherrer Institute, Switzerland
  "Solar Thermal Extraction of Zinc from Zinc Sulfide – An Assessment"

- M. Balat-Pichelin*, J.M. Badie, T. Paulmier, J.F. Robert
  *IMP-CNRS, Font-Romeu, France
  "Concentrated Solar Energy as a Tool For the Study of Material Behaviour Under Extreme Environment"

- S. Suleimanov*, V. Dyskin, Z. Settarova
  *Scientific Association "Physic-Sun", Tashkent, Uzbekistan
  "Special Mirrors for Solar Energy Application"

- J.-M. Badie, B. Granier*
  *IMP/CNRS Font-Romeu, France
  "Solar Induced Fluorescence of Gaseous Yttrium Monoxide. Thermal Aspects"

- T. Pipoli*, J.O. Besenhard, M. Schautz, W. Kern
  *Graz University of Technology, Austria
  "Photocatalytic Decomposition of Martian Atmospheric Carbon Dioxide"

- W. Rivera*, C.O. Rivera
  *Centro de Investigación en Energía, Temixco, Morelos, México
  "Modelling of a CPC Working as the Generator-Absorber of an Intermittent Solar Absorption Refrigeration System Operating with the Ammonia-Lithium Nitrate Mixture"

19:00-22:00 ***Banquet***

Friday, September 6, 2002

9:00-10:40 ***Plenary Session***

Solar Chemistry

Chairman: Michael Epstein, Weizmann Institute of Science, Israel

Keynote

- A. Steinfeld
  ETH-Swiss Federal Institute of Technology / Paul Scherrer Institute, Switzerland
  "Solar Thermochemical Production of Hydrogen: Present Status and Future Prospects"

Solar Chemistry Projects

- S. Möller*, R. Buck, R. Tamme, M. Epstein, D. Liebermann, M. Meri, U. Fisher, A. Rotstein, C. Sugarmen
  *DLR Stuttgart, Germany
  "Solar Production of Syngas for Electricity Generation: SOLASYS Project Test-Phase"
- C. Wieckert*, M. Epstein, G. Olalde, R. Palumbo, H.-J. Pauling, H.-U. Reichardt, J.-F. Robert, S. Santen, A. Steinfeld
  *Paul Scherrer Institute, Switzerland
  "The SOLZINC-Project for Solar Carbothermic Production of Zn from ZnO"
- J. Blanco
  CIEMAT - Plataforma Solar de Almeria, Spain
  "PSA Solar Water Detoxification Projects"
- K.-H. Funken
  DLR Köln, Germany
  "Solar Photochemical Technology for Synthetic Applications: Advances and Applications"

10:40-11:00 ***Coffee Break***

11:00-12:30 ***Closing Summary Plenary***

- A. Wokaun
  Paul Scherrer Institute, Switzerland
  "Summary and Outlook"
- Prizes: Best Poster Presentation Award, Best Oral Presentation Award
- Announcement of the 12th SolarPACES Symposium
- Photo Shooting

12:30-14:00 ***Lunch Break***

14:00-17:00 ***Afternoon Program***

- Technical Tour to ALSTOM Power
- Technical Tour to the Paul Scherrer Institute

  Registration at the Reception Desk. Number of places is limited. Tours will depart from Karl Schmid-Strasse at 14:00. Please arrive 10 minutes prior to tour departure.
- Hydropole - Swiss Hydrogen Association

SEGS Plant, California

Poster Presentations

Posters will be displayed during the 3-day Symposium. Poster presenters will staff their 84.1cm x 59.4cm (A1 dimensions) displays on Wednesday, September 4, 15:30-18:30.

- R. Adinberg*, M. Epstein
  *Weizmann Institute of Science, Israel
  "Experimental Study of Solar Reactors for Carboreduction of ZnO"
- H. A. A. Alrobaei
  Higher Mechanical and Electrical Engineering Institute, Hoon, Libya
  "Study The Effectiveness Of Hybrid Solar / Fossil Fuel Desalination Plant"
- I. Alxneit
  Paul Scherrer Institute, Switzerland
  "Are Oxygen Atoms a Primary Product of the Thermal Dissociation of Zinc Oxide?"
- C.E. Andraka*, J.B. Moreno, K.S. Rawlinson, T.A. Moss, R.B. Diver, P.G. Cordeiro
  *Sandia National Laboratories, USA
  "Heat Pipe Receiver Development Progress"
- V.I.Anikeev
  Boreskov Institute of Catalysis, Novosibirsk, Russia
  "Supercritical Fluids as Reaction Media for Solar Assisted Chemical Reactions"
- V.I.Anikeev*, S.K.Baimukhanov
  *Boreskov Institute of Catalysis, Novosibirsk, Russia
  "Economic Efficiency and Environmental Aspects for Application of Solar Assisted Closed-Loop Thermochemical Cycles for Electricity Generation in Kazakhstan Area"
- J. Arroyave, A. Correa, G. Hincapié, N. Cuervo, G. Restrepo, G. Peñuela*
  *University of Antioquia, Medellín, Colombia
  "Comparation Methomyl and Malathion Detoxification Using Concentrating Solar Collector"
- E. R. Bandala, A. Paredes, I. Gómez, S. Gelover, Ma. T. Leal, C. A. Estrada*
  *Centro de Investigación en Energía, Universidad Nacional, Temixco, Morelos 62580, México
  „Solar Photocatalytic Degradation of Two Pesticides in Two Solar Collectors"
- D. M. Blake*, L. Moens, M. J. Hale, H. Price, D. Kearney, U. Herrmann
  *NREL, Golden, USA
  "New Heat Transfer and Storage Fluids for Parabolic Trough Solar Thermal Electric Plants"
- J. Blanco*, E. Zarza, D. Alarcón, S. Malato, J. León
  *CIEMAT - Plataforma Solar de Almeria, Spain
  "Advanced Multi-Effect Solar Desalination Technology: the PSA Experience"
- P. Bodek*, I. Alxneit
  *Paul Scherrer Institute, Switzerland
  "Rekin, an Experiment to Study the Kinetics of the Oxidation of Zinc Vapor"
- D. Buie*, C. Dey, D. Mills
  *University of Sydney, Australia
  "Optical Considerations in Line Focus Fresnel Concentrators"
- J.-P. Budliger
  Plan-Les-Ouates, Genf, Switzerland
  "New Stirling Solar Electric Generation System Using Parabolic Dish Concentrators"

- C. Gómez-Camacho
  Universidad de Sivilla, Spain
  "Classical Thermodynamics of Fuels Solar Synthesis"

- R. Christmann*, B. Hoffschmidt, P. Rietbrock , R. Pitz-Paal. A.H. Heinrich
  *DLR Köln, Germany
  "Fix-Focus-Trough Collector under Testing - Experiences in Operation and Results of the Qualification Campaign"

- C.H.Chung, G.Y.Han*, T.B. Seo, Y.H.Kang
  *Sungkyunkwan University, Suwon, Korea
  "Steam Reforming of Methane for Chemical Heat Storage as a Solar Heat Storage"

- R. L. Conte Jr.
  Grafton, MA, USA
  "The Wind from the Sun Power Plant"

- E. Denis
  Four Solaire Development, Mont-Louis, France
  "Process for the firing of ceramics between 1000 and 1300°c using the solar furnace at Mont-Louis, France"

- H. Dong*, J. Karni
  *Qingdao Institute of Architecture and Engineering, China
  "The Multi-Zone Convection Model of the Heat Transfer of Pin Fin Arrays"

- A. Dvoretsky*, A. Kuryatov
  *Crimean Academy of Nature Preserving and Resort Construction Simferopol, Crimea, Ukraina
  "Distribution of Solar Energy on a Receiver Surface"

- O. Enea
  University of Poitiers, France
  "Photo-Electrochemical Experiments with Si/BDD/TiO2 Under Artificial or Solar Light"

- M. Eck*, W.-Dieter Steinmann, J. Rheinländer
  *DLR Stuttgart, Germany
  "The Influence of a Tilted Absorber Tube on the Maximum Temperature Difference"

- A. Fahmi*, A.V. Saidi, M.J. Moosamialy
  *Moshanir Power Engineering Consultant Tehran, Iran
  "Simulation of ISCC Power Plant Performance"

- L. Fara*, S. Fara, A. Valverde Cantón, D. Finta
  *Romanian Agency for Renewable Energy (NARE), Bucharest, Romania
  "General Approach of the Monitoring Systems for Central Receiver Plants (CRP) and PV Plants (PVP)"

- X. García-Casals
  Universidad Pontificia Comillas, Departamento de Fluidos y Calor, Madrid, Spain
  "SEGS in Barcelona: Analysis, Simulation and Costs Evaluation of Parabolic Trough Power Plants in a High Latitude Site"

- X. García-Casals*, V. Mansilla-Gonzalez, S. Baltasar-Romera, A. Fernández-Sauras, M. Lavandeira
  *Universidad Pontificia Comillas, Departamento de Fluidos y Calor, Madrid, Spain
  "Comparison of Different Hybrid and Only Solar Parabolic Trough Power Plants in Huelva, Spain"

- X. García-Casals*, D. Pueyo-Brochard
  *Universidad Pontificia Comillas, Departamento de Fluidos y Calor, Madrid, Spain
  "Biomass-Solar Hybrid Power Plant in Huelva: Design and Performance Evaluation"

Poster Presentations

- A. L. Gusev
  RFNC-VNIIEF, Nizhni Novgorod region, Sarov, Russia
  "Solar and Hydrogen Power Plants. Exergetic Analysis of their Operation. Materials, Design Principles and Development Perspectives"

- D. Hirsch, A. Steinfeld
  *ETH-Swiss Federal Institute of Technology, Switzerland
  "Hydrogen Production by Solar Thermal Decomposition of Natural Gas"

- C. Hoyer*, C. Schillings, D. Heinemann, H. Mannstein, F. Trieb
  *University of Oldenburg, Germany
  "Solar Resource Assessment and Site Evaluation Using Remote Sensing Methods Part I: Comparison of Two Remote Sensing Methods for the Determination of Solar Beam Irradiation"

- S. Huber
  Swiss Solar Tech Ltd., Summerland BC, Canada
  "The Laser-Welded Technique Serves the Solar Industry"

- A. Imenes*, C. Dey, D. Mills, D. Buie, S. Bosi
  *University of Sydney, Australia
  "A Small Paraboloidal Concentrator for Material Testing and Absorber Performance Characterisation"

- G. Johnston*, E. Lüpfert
  *Australian National University, Canberra, Australia
  "Remote Surface Sensing for 3-D Characterisation of the Euro Trough Concentrator with Close-Range Photogrammetry"

- H. Kaneko, Y. Tamaura*, N. Hasegawa, T. Kodama, K. Lovegrove, A. Luzzi
  *Tokyo Institute of Technology, Japan
  "ZnFe2O4-Zn/Fe3O4 system for Solar H2 Generation by Two-Step Water Splitting"

- N. D. Kaushika*, A. Mishra
  *Indian Institute of Technology Delhi, New Delhi, India
  "Computer Model of Parabolic Trough Solar Power Plants"

- E. Kazarian*, M. Ghazaryan
  *University of Armenia, Yerevan, Armenia
  "Optimization of Solar Energy Collektor Parameters and Characteristics for Heliosystem of Heat Supply"

- E. Kazarian*, M. Ghazaryan, S. Vardanyan
  *University of Armenia, Yerevan, Armenia
  "Advanced of Solar and Biomass Heating for the Complex Houses"

- M. Keunecke, A. Meier*, R. Palumbo, A. Reller
  *Paul Scherrer Institute, Switzerland
  "Solar Thermal Dissociation of ZnO - Experimental Investigation and Modeling of the Recombination Reaction in a Laboratory Scale Setup"

- R. Kistner*, V. Quaschning, W. Ortmanns
  *DLR, Plataforma Solar de Almeria, Tabernas, Spain
  "The Promotion of Solar Power Plants by Means of National Market Support Tools"

- T. Kodama*, Y. Isobe, Y. Kondoh, S. Yamaguchi, K-I. Shimizu
  *Niigata University, Japan
  "Ni/Ceramic/Molten-Salt Composite Catalyst with High-Temperature Thermal Storage for Use in Solar Reforming Processes"

- J. Koetter
  Solar-Institut Jülich, Germany
  "Evolution and Test of Solar Process Heat Systems for the Commitment in Sun-Rich Countries"

- S. Kronshage*, C. Schillings, F. Trieb
  *DLR Stuttgart, Germany
  "Solar Resource Assessment and Site Evaluation Using Remote Sensing Methods
  Part II: Country Analysis for Solar Thermal Power Stations"

- D. Krüger*, R. Pitz-Paal, A. Lokurlu, F. Richarts
  *DLR Köln, Germany
  "Heating- and Cooling Supply of a Hotel with Parabolic Trough Collectors"

- D. Krüger*, K.-J. Riffelmann, K. Hennecke, R. Eberhard, A. Ahmet, R. Pitz-Paal
  *DLR Köln, Germany
  "Testing of a Secondary Reflector for a Process Heat Parabolic Trough Collector"

- A. Lentz, R. Almanza, V. Ruiz*
  *Universidad de Sivilla, Spain
  "A Hybrid Geothermal Solar System to Increase the Quantity of Steam in Cerro Prieto Baja
  California Mexico"

- J. León*, E. Zarza, L. Valenzuela
  *CIEMAT Almeria, Spain
  "Direct Steam Generation. Three Years of Operation of Diss Project"

- W. Lipinski*, A. Meier, A. Steinfeld
  *Paul Scherrer Institute, Switzerland
  "Towards the Production of Solar Lime: Modeling and Experimentation"

- E. Y. Loktionov*, Y. V. Loktionov, E. E. Shpilrain
  *Moscow State Technical University (MSTU), Moscow, Russia
  "Solar Concentrating Technologies on Polar Circle: Demonstration for Extreme Environmental
  Conditions of Arctic & Antarctic"

- E. Y. Loktionov*, M. I. Osipov, Y. V. Loktionov
  *Moscow State Technical University, Moscow, Russia
  "Experimental Investigations of Steam Generation with Cone-Concentrator"

- E. Y. Loktionov*, M. I. Osipov, Y. V. Loktionov
  *Moscow State Technical University, Moscow, Russia
  "Thermal Fields' Stabilization of Tubular Receiver in Focus-Line of a Cone-Concentrator's by
  Using of Low-Temperature Heat Pipe"

- R. Malayeri, S. Zunft*, M. Eck
  *DLR Stuttgart, Germany
  "Compact Field Separators for the Direct Steam Generation in Parabolic Trough Collectors:
  A model study"

- N. Monnerie*, J. Ortner, M. Roeb
  *DLR Köln, Germany
  "Can the Solar Manufacturing of ε-Caprolactam Economically Compete with Conventional Routes?"

- J.P. Murray
  IMP-CNRS, Odeillo, Font-Romeu Cedex, France
  "Aluminum Reduction using Solar Process Heat"

Poster Presentations

- N.M. Nahar
  Central Arid Zone Research Institute, Jodhpur, India
  "Resource Assessment at the Proposed Site of 35 MWe Solar Thermal Power Plant at Mathania (Jodhpur), India"

- A. M. Omer
  University of Nottinghamshire, UK
  "Solar Energy in Sudan"

- N. Ortega*, R. Best
  *Centro de Investigación en Energía, UNAM, A. P Morelos, 62580, México
  "Modelling of a Compound Parabolic Concentrator with Direct Vapour Generation for Refrigeration Applications"

- T. Osinga*, C. Wieckert, U. Frommherz, A. Steinfeld
  *ETH-Swiss Federal Institute of Technology, Switzerland
  „Carbothermic Reduction of ZnO Using Concentrated Solar Energy"

- V.V. Pasichny
  National Academy of Science of Ukraine (IPMS), Ukraine
  "Using of the Concentrated Solar Energy for the Thermal Processing of The Natural Basalt"

- J. Petrasch*, A. Steinfeld
  *ETH-Swiss Federal Institute of Technology, Switzerland
  "Combined Conduction-Convection-Radiation Heat Exchange in a Solar Cavity-Receiver – Dynamic Modeling and Experimental Validation"

- A. Roy
  Ben-Gurion University, Beer-Sheva, Israel
  "Institute for Solar Power Systems Cost-Benefit Evaluation Standards"

- V. Sarria, P. Peringer, J. Caceres, J. Blanco, S. Malatob, C. Pulgarin*
  *EPFL Lausanne, Switzerland
  "Solar Degradation of 5-Amino-6-Methyl-2-Benzimidazolone by TiO2 and Iron(III) Catalyst with H2O2 and O2 as Electron Acceptors"

- B. Schaffner*, W. Hoffelner, A. Meier, D. Wuillemin, A. Steinfeld
  *Paul Scherrer Institute, Switzerland
  "Solar Thermal Recycling of Electric Arc Furnace Dust"

- Ph. Schramek*, D.R. Mills
  *SHP, Starnberg, Germany
  "A Case Study of a Multi Tower Solar Array in the Urban Environment"

- P.J. Sebastian*, R. Vazquez, A. Olea, J. Riquelme, J. Moreira, D. Eapen, X. Mathew and S. Velumani
  *CIE-UNAM, Temixco, Morelos, México
  "A Photovoltaic- Photoelectrochemical- Photobiological Hydrogen Production System Using Concentrated Solar Power"

- A. Segal*, M. Epstein
  *Weizmann Institute of Science, Rehovot, Israel
  "Modeling and Calculated Performance of a Ground Solar Reformer"

- T. Seo*, K. Y. Han, Y. H. Kang
  *Inha University, Inchon, Korea
  "Convective Heat Loss Decrease from a Cavity Receiver for a Dish-Type Solar Thermal System"

- F. M. F. Siala*, M. T. Elayeb
  *Center for Solar Energy Studies, Tripoli, Libya
  "Calculation of the Shading Factor in Heliostat Fields"

- W. D. Steinmann*, M. Eck
  *DLR Stuttgart, Germany
  "Modeling of Direct Steam Generation in Parabolic Troughs by Component-Oriented Simulation Tool"

- A. Stride*, D. Worsley, A. Hopkins
  *Welsh Technology Centre, Port Talbot, Wales, UK
  "Photocatalytic Degradation Mechanisms of Substituted Toluenes in Solution and Vapour Phase"

- M. Sturzenegger*, C. Guesdon, L. Winkel
  *Paul Scherrer Institute, Switzerland
  "Solar Extraction of Metals from their Sulfides"

- F.M. Téllez, B. Hoffschmidt , A. Valverde, J. Fernández-Reche, M. Romero*, R. Monterreal, J. Ballestrín
  *CIEMAT - Plataforma Solar de Almeria, Spain
  "Performance Evaluation of the 200 kWt 'HitRec II' Volumetric Receiver"

- F.M. Téllez*, M. Romero, Mª J. Marcos, V. Fernández, A. Valverde, J.F. Reche
  *CIEMAT Madrid, Spain
  "Development of SIREC-1 Wire Mesh Open Volumetric Solar Receiver Prototype"

- D. Trommer*, D. Hirsch, A. Steinfeld
  *ETH – Swiss Federal Intitute of Technology, Switzerland
  "Kienetic Analysis of CH4 – Cracking under Direct Irradiation"

- R. Trujillo, J. Torres, M. Silva*, V. Ruiz
  *Escuela Superior de Ingenieros, Camino de los Descubrimientos Sevilla, Spain
  "Feasibility Study of Solar Hybrid Receivers"

- V.S.Trukhov*, I.A.Tursunbaev, E.P.Orda, A.I.Lezhebokov, A.I.Tursunbaev, A.P.Korobkov
  *Scientific Association, Tashkent, Uzbekistan
  "Autonomous Solar Dual Power Installation for Combined Electrical and Heat Supply"

- H. R. Tschudi
  Paul Scherrer Institute, Switzerland
  "Modelling of the Radiative Ablation of a Zinc Oxide Rod with Volumetric Interaction of Light and Matter"

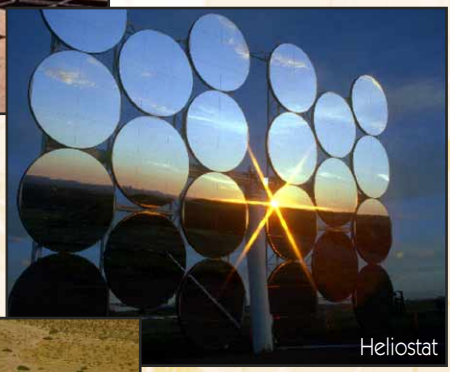
- P. v. Zedtwitz*, A. Steinfed
  *ETH – Swiss Federal Intitute of Technology, Switzerland
  "Hydrogen Production by Solar Thermal Gasification of Coal"

- A.S. Wiasmitinow, V.A. Kirillov*, A.B. Shigarov, N.A. Kuzin, S.I. Fadeev
  *Boreskow Institute of Catalysts, Novosibirsk, Russia
  "Hybrid Compact Steam Reformer for Hydrogen Production for Fuelcells"

- C. Wieckert*, R. Palumbo, U. Frommherz
  * Paul Scherrer Institute, Switzerland
  "A Two Cavity Reactor for Solar Chemical Processes: Heat Transfer Model and Appli-Cation to Carbothermic Reduction of ZnO"

- R. A. Zakhidov*, S. N. Kivalov, N. K. Kivalov, U. A. Tadjiev
  *Academy of Science of Uzbekistán, Tashkent, Uzbekistán
  "Applying of Heat Tubes for Cooling of Solar Cells in Photoelectric Modules with Stationary Concentrators"


Heliostat Field


Heliostat


Solar Tower Technology

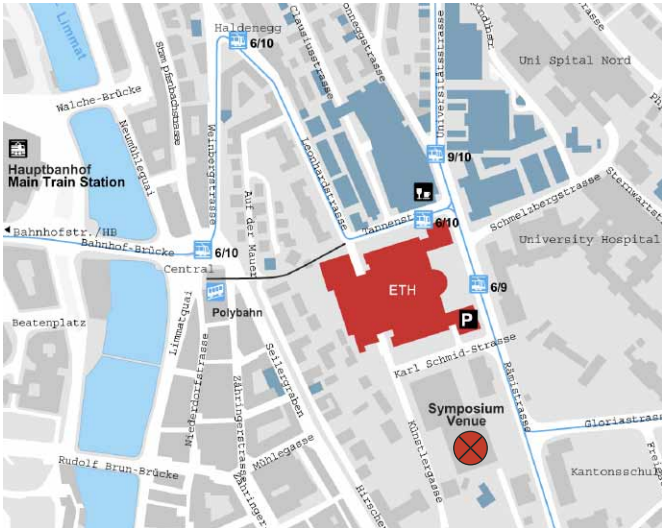

Solar Dish Technology

The symposium will be held at the University of Zurich, Switzerland, overlooking the lake of Zurich and within walking distance from the heart of the city. Zurich is the gateway to the Swiss alpine region which offers spectacular sightseeing tours. For more detailed information about this beautiful city, including museums, parks, shopping, and transportation see ***www.zurichtourism.ch***

Venue Address: ***University of Zurich, Rämistrasse 71, Zürich***

How to reach the Symposium's Venue

Zurich International Airport has a direct railway link (15 minutes ride) to Zurich Main Train Station "Zürich HB". Zürich HB can also be reached by train from major European cities. For information on train schedules: ***www.sbb.ch/pv/index_d.htm***



From Zürich HB, you can reach the Symposium's venue: (refer to plan of site)

- **On foot:** As you come from the track head for Bahnhofplatz and follow the tram rail.
- **By tram:** Take the tram no. 10 at Bahnhofplatz (closer to main station) or the tram no. 6 at Bahnhofstrasse, then get out at ETH Zentrum/Universitätsspital. There is a tram every 10 minutes.
- **By cable car:** Head for Bahnhofplatz, turn to the left and walk over the bridge. On the other side of the Limmat river, turn slightly to the right where you can see the station of the cable car „Polybahn". The cable car operates only weekdays.
- **By car:** Parking places in the University area are limited

VENUE

Technical Workshops

SolarPACES's Task-I Solar Electricity, Task-II Solar Chemistry, and Task-III Advanced Components and Systems, will hold their technical workshops on ***September 9-10*** in:

Hotel Interlaken
Höhenweg 74
CH-3800 Interlaken
Phone +41-33-826 68 68
Fax +41-33-826 68 69

Reservations directly with the Hotel (using code "SolarPACES")

Accompany Person Program

The Zurich Tourist Office will be offering a variety of guided tours and excursions, such as a full-day excursion to the Jungfraujoch at 3600 m, one of the most spectacular scenic mountain sites in the world, or a half-day excursion to the Rhine Falls, the largest waterfall in Europe. Information at ***www.zurichtourism.ch*** Registration at the Reception Desk at least one day in advance. Places are limited.

Interlaken

Registration

Please fill out the **"Registration Form"** included with this leaflet.

Registration includes:

- Symposium's package including the Symposium Proceedings.
- midday lunches on Sept. 4, 5, and 6.
- snack dinner on Sept. 4.
- coffee, tee, and refreshments during the coffee breaks.
- Banquet on Sept. 5.
- technical tours.

Registration Fee

	Before Aug 1	After Aug 1
Regular	350 SFr.	400 SFr.
Student* (with ID)	50 SFr.	100 SFr.
Banquet** on Sept. 5	100 SFr.	100 SFr.

*reduced fee sponsored by the Huber-Kudlich Foundation; Banquet not included

**for Student or Accompany Person

Substitution and Cancellation Policy

Name substitution is permitted at any time. Cancellation request must be made in written. No refunds will be made after August 15, 2002.

Bild: Zürich Tourismus

Hotel Accommodation

Please fill out the **"Hotel Accommodation Form"** included with this leaflet. Hotel accommodation is not included in the registration fee and should be arranged separately through the Zurich Tourist Office.

Contact Information

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