

SPG - MITTEILUNGEN COMMUNICATIONS DE LA SSP

Nr. 10 , 05/2002

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Short Announcements

EPS-12: Trends in Physics, August 26-30, 2002 at Eötvös Loránd University in Budapest, Hungary

The conference web-site www.eps12.kfki.hu/ will provide all information and is used also for registration and abstract submission.

Annual Meeting of the SANW, Sept. 18-20, 2002 in Davos.

The SPS has joined the SLF (Inst. für Schnee und Lawinen Forschung, Davos) in organizing workshop 15 prepared by Dr. Jakob Rhyner (SLF) at the SANW annual meeting.

Speakers:

- H. J. Wiesmann, ABB, "Snowflakes"
- F. J. Elmer, Uni Basel, "Instabilities and pattern formation"

Additional information can be found at www.sanw-davos02.ch .

Annual Meeting 02 of the SATW, Sept. 26-27, 2002, ETH Zürich

Meeting Subject: "Microsystems: Design, Evolution, Revolution for chemistry, pharmaceuticals and biotechnology".

Additional information can be found at www.satw.ch .

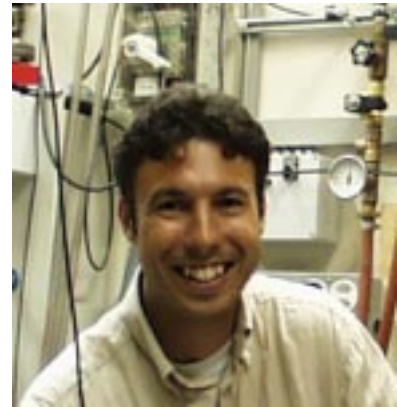
Annual Meeting of the SPS, March 20-21, 2003, Uni Basel

Detailed information will be released when available.

The Winners of the SPS-Awards 2002

SPS Award for Applied Physics sponsored by Phonak

Michele Saba receives the Phonak Award of the Swiss Physical Society for his work on Ultrafast Light Amplification in Semiconductor Microcavities. In intricate experiments he has investigated the elementary excitations in these microcavities, which are coupled modes of confined excitons and photons, called "cavity polaritons". By a careful design, he has obtained parametric light amplification by stimulated polariton scattering with very high gain at temperatures up to 200 K. The amplification is associated with a dynamic polariton condensate containing 105 polaritons occupying the same quantum state. These results demonstrate the high potential of optical microcavities for opto-electronic applications.



Ultrafast Light amplification in semiconductor microcavities

Optoelectronics combines the advantages of electronics (fast manipulation of conduction properties by means of applied voltages) with those of optical interconnection (huge amounts of information easily transmitted). Optically-active artificial structures provide smaller and smaller devices where, exploiting the laws of quantum mechanics, the light is manipulated very fast and very efficiently. An intriguing example of this new class of devices are semiconductor microcavities, where the wavefunctions of photons and electrons in the semiconductor intimately overlap. The resulting fundamental optical excitations, called polaritons, behave as composite bosons and, like Cooper pairs in superconductors, can condense in their fundamental quantum state. As polaritons are optically active, their condensation can generate or amplify light. Our group demonstrated that microcavities act as unprecedented light amplifiers, with huge gain coefficients and potential THz repetition rate. Light amplification due to this subtle quantum admixture between electron and photons is an extremely robust phenomenon, surviving almost up to room temperature. The quantum correlation between optical excitations in microcavities could open new ways to beat the uncertainty limits in areas such as secure communication, computing, metrology and imaging.

M. Saba, C. Ciuti, J. Bloch, V. Thierry-Mieg, R. André, Le Si Dang, S. Kundermann, A. Mura, G. Bongiovanni, J. L. Staehli and B. Deveaud:

"High-temperature ultrafast polariton parametric amplification in semiconductor microcavities", *Nature* 414, 731 (2001)

M. Saba, F. Quochi, C. Ciuti, U. Oesterle, J. L. Staehli, B. Deveaud, G. Bongiovanni and A. Mura:

"Crossover from Exciton to Biexciton Polaritons in Semiconductor Microcavities", *Phys. Rev. Letters* 85, 385 (2000)

SPS Award for Condensed Matter Physics sponsored by IBM

Stefan Oberholzer receives the IBM Award of the Swiss Physical Society for his work on Quantum Shot Noise in Mesoscopic Systems. He has carried out fluctuation measurements in mesoscopic structures in order to investigate various phenomena of fundamental interest. He has realized an experiment measuring current-current correlations between different leads. This is the fermionic counterpart of the famous Hanbury Brown and Twiss experiment, and the results clearly exhibit the effects of the Pauli exclusion principle. In a further experiment, he has analyzed the voltage fluctuations across a chaotic cavity and observed the crossover from particle-like to wave-like scattering resulting from quantum uncertainty.



Quantum Shot Noise in Mesoscopic Devices

Shot noise, predicted in 1918 by W. Schottky, is a non-equilibrium phenomenon which occurs as a consequence of the quantization of charge. In recent years, extensive investigation of shot noise in coherent conductors (mesoscopic devices) has yielded a tremendous amount of new insight into charge transport. For example, shot-noise experiments can be used to determine the charge of quasiparticles involved in transport. Shot-noise measurements were also extended to current-current correlations between different leads. In the simplest possible experiment of this kind, we explored the Fermionic statistics of a degenerate beam of electrons by measuring current-current correlations between the two exits of an electron beam-splitter, in analogy to the famous Hanbury Brown and Twiss experiment, which was carried out with photons obeying Bosonic statistics.

In contrast to the transfer of single electrons in vacuum tubes, charge carriers in mesoscopic devices do not propagate as isolated entities through free space, but they are part of a degenerate and quantum-coherent Fermi sea. Despite this remarkable difference, the mathematical expressions for shot noise of both systems are very similar. A deeper analysis of the historical experiments showed that shot noise of vacuum tubes is a purely classical phenomenon. This is in profound contrast to shot noise of coherent conductors. Here, shot noise is a quantum effect (similar to tunneling), disappearing in the classical limit, in which waves are replaced by trajectories. To probe this quantum-to-classical crossover in an experiment, open chaotic cavities were used as tunable model systems. The cavities were realized in a two-dimensional electron gas by means of metallic gates which locally deplete the electron gas. In these devices shot noise is present if the electronic motion through the cavity is "smeared" by quantum diffraction. In contrast, shot noise disappears if the electron motion is classically deterministic. The experiments have shown that shot noise of (coherent) electronic devices is a direct measure of the degree of quantum uncertainties.

M. Henny, S. Oberholzer, C. Strunk, T. Heinzel, K. Ensslin, M. Holland and C. Schönberger:
"The Fermionic Hanbury Brown and Twiss Experiment", *Science* 284, 296 (1999).

S. Oberholzer, E. V. Sukhorukov and C. Schönberger:
"Crossover between classical and quantum shot noise in chaotic cavities", *Nature* 415, 765 (2002).

SPS Award for General Physics sponsored by ABB

Holger Reimerdes receives the ABB Award of the Swiss Physical Society for his work on Magnetohydrodynamic Stability Limits in the Tokamak Configuration Variable (TCV). With a dense array of magnetic probes he has analyzed in detail the structure and temporal evolution of various plasma instabilities in the TCV. In particular, he has obtained important results on the properties of sawtooth relaxation oscillations and on the triggering of the sawtooth crash; he has observed that edge-localized modes are preceded by coherent magnetic oscillations with a strong toroidal asymmetry; and he has discovered a new disruptive current limit well below the conventional current limit, but consistent with ideal magnetohydrodynamic stability calculations. With these experiments, he has contributed to a thorough understanding of plasma instabilities which is crucial for the operation of a fusion reactor.



Magnetohydrodynamic stability limits in the TCV Tokamak

In the pursuit of the exploitation of nuclear fusion as a commercial energy source, one tries to maximise the pressure of magnetically confined tokamak plasmas. Magnetohydrodynamic (MHD) instabilities, however, can limit the pressure and degrade the energy confinement of these plasmas. The "Tokamak Configuration Variable" (TCV), unique due to its capability to produce a variety of plasma shapes, and equipped with a flexible electron cyclotron wave heating and current drive system, has been used to study several instabilities which are relevant for the operation of a future fusion reactor.

The combination of the access to extreme plasma shapes and a localised heat source was extensively used in an analysis of central relaxation oscillations, so-called "sawteeth". Systematic scans revealed a strong dependence of their behaviour on the plasma shape, which can be linked to the role of ideal or resistive MHD in triggering the relaxation [1]. The relevance of ideal MHD was also demonstrated in experiments which tested and confirmed a predicted deviation from the well-established linear Troyon-scaling of the global pressure limit with plasma current in highly elongated plasmas [2]. New insight was gained into the dynamics of coherent magnetic oscillations, which precede a periodic expulsion of energy from the plasma edge. Unlike conventional MHD modes, these "edge-localised" modes are observed to start at one toroidal location [3]. This work also adds to the understanding of the evolution of tearing modes by providing the first clear observation of a transition of a current driven "conventional" tearing mode to a pressure driven "neoclassical" tearing mode [4].

The results obtained reveal several previously unobserved features of pressure and hence performance limiting instabilities. Most of the new observations can be explained by theory and, therefore, improve the predictive capabilities with respect to fusion experiments and contribute to our confidence in the next major step in fusion research.

[1] H. Reimerdes, A. Pochelon, O. Sauter, T. Goodman, M. A. Henderson, An. Martynov: Plasma Phys. Control. Fusion 42, 629 (2000)

[2] F. Hofmann, O. Sauter, H. Reimerdes, I. Furno, A. Pochelon: Phys. Rev. Lett. 81, 2918 (1998)

[3] H. Reimerdes, A. Pochelon, W. Suttrop: Nucl. Fusion 38, 319 (1998)

[4] H. Reimerdes, O. Sauter, T. Goodman, A. Pochelon: Phys. Rev. Lett. 88, 105005 (2002)

Swiss Physics ?

I believe every physicist is striving hard to excel in his field and eagerly seeks to receive international recognition. And this is fine.

I believe that, nowadays maybe more than ever, physics can't afford to neglect its image in the public eye. The "public eye" is a polite euphemism to designate all those who decide for us and fund us. What shares of the FN will go to exact sciences? What priorities of the scientific endeavours of the European Community will remain connected to physics? Who decides and why ? You may have many such questions on top of your mind.

As newly elected president of the Swiss Physical Society, I wonder where people find advantage in living their profession in a scatter of small societies, presumably each struggling to find good souls ready to sacrifice part of their precious time to associative life. Sure, human beings are fundamentally social. But wouldn't that be sad, if it turned out that these societies were created because long ago a few eager minds thought they would never make it to the circle of decision makers of existing societies, so they created their own ? It would be sad indeed, since these once favoured rows are now clearing dangerously of volunteers !

I believe that science managers are working on planetary dimensions and it is not clear that the nanoscale is the way to a true leadership of science for and by scientists.

Sure, in Switzerland, we live happily as a confederation of 24 states, each divided finely into local governments. However, the European Physical Society (EPS) recognizes as Swiss "physicists" the members of the SPS and the Individual Ordinary Members (IOM) making a special point of paying an annual subscription to EPS.

I will try to find the time to establish what SPS, through its ties to EPS, could offer those various Swiss associations of physicists.

I believe we must be grateful to all of those who dedicate part of their time, some have done so for decades, to help defend the interests of physicists in Switzerland and beyond.

I can't invoke all, inside or outside SPS, for the risk of omitting someone is too high and this would be quite unfair.

The present committee of the SPS includes :

- Jürg Jourdan (Uni Basel), who treats matters pertaining to astrophysics, theoretical physics and particle physics;
- Jérôme Faist (Uni Neuchatel), whose task to connect with condensed matter physicists and help make decision on issues confronting the committee;
- Stefano Alberti (CRPP) helps the committee with all matters of large facilities;
- Thomas Christen (ABB), among other things, deals with the SPS awards;

- Thomas Jung (PSI), served as president of SPS, now represents us at the IUPAP and at the SATW;
- Jean-Marc Bonard (EPFL) agreed to act as Secretary of the committee, and as such, fulfils a variety of tasks (no secretariat !);
- Tibor Gyalog (Uni Basel), our treasurer;
- Hans Beck (Uni Neuchatel), our representative to the SANW;
- Philippe Aebi (Uni Fribourg), Antoine Pochelon (CRPP), our auditors.

We are still seeking a candidate for the position of Vice-President !

I believe the Annual Meeting of the SPS must be an opportunity for all of us to find out what goes on in physics in Switzerland. It must be a forum where we can converse on common concerns as physicists working in Switzerland.

About 300 of us believed this was the case last February in Lausanne. Imagine a young physicist returning to Switzerland to engage in a long-standing career in physics. Where will he learn who's who outside his field ?

I hear a young mind in the back asking : what 'concerns' ? How about :

- Are the Bologna agreements affecting your curriculum ?
- Is the "relève académique" an issue in your institution ?
- How's the networking of campus working for you ?

The SPS committee is preparing the next annual meeting, that will take place in March 2003 in Basel. We are seeking session organizers in fields that were mostly not covered last year. A pattern can be distinguished over the years : surprising sessions attract a lot of people ! We hope the next meeting will surprise you again !

I believe we are very fortunate that Christophe Rossel (IBM), as Secretary of the Executive committee of EPS, has contributed to attracting the big event of 2005, "The World Year of Physics", to Switzerland, to Zürich most likely. His efforts will be backed by our colleague Prof. Martin Huber (Uni Basel) who accepted to enter the EPS committee as President Elect. Our best wishes to him !

The World Year of Physics is a manifestation that seeks to enhance the visibility of physics in the "public eye". 1905 was a major year in the publications of A. Einstein, so it is hoped that the hundredth birthday of this great year will strike people's imagination. You can find out more about the "WYP" in a recent issue of Europhysics News (see also the article in this issue of the SPS-Communications).

Jean-Philippe Ansermet, SPS President

Ausschreibung der SPG Preise für 2003

Auch im kommenden Jahr sollen wieder drei SPG Preise, die je mit Fr. 5'000.- dotiert sind, vergeben werden:

- ◇ SPG Preis gestiftet vom ABB Forschungszentrum für eine hervorragende Forschungsarbeit auf allen Gebieten der Physik
- ◇ SPG Preis gestiftet von der Firma IBM für eine hervorragende Forschungsarbeit auf dem Gebiet der Kondensierten Materie
- ◇ SPG Preis gestiftet von der Firma Phonak für eine hervorragende Forschungsarbeit auf dem Gebiet der Angewandten Physik

Die SPG möchte mit diesen Preisen junge PhysikerInnen für hervorragende wissenschaftliche Arbeiten auszeichnen. Die eingereichten Arbeiten müssen entweder in der Schweiz oder von SchweizerInnen im Ausland ausgeführt worden sein. Die Beurteilung der Arbeiten erfolgt auf Grund ihrer Bedeutung, Qualität und Originalität.

Der Antrag für die Prämierung einer Arbeit muss schriftlich begründet werden. Die Arbeit muss in einer renommierten Zeitschrift publiziert oder zur Publikation angenommen sein. Der Antrag muss die folgenden Unterlagen enthalten: Begleitbrief mit Begründung, Lebenslauf des Kandidaten, die zu prämierende Arbeit, eventuell ein Gutachten und eine Publikationsliste. Diese Unterlagen werden elektronisch im "pdf"-Format direkt an den Präsidenten der SPG eingereicht:

jean-philippe.ansermet@epfl.ch

Einsendeschluss: 01. November 2002

Die Preise werden an der Jahrestagung der SPG überreicht.

Das Preisreglement befindet sich auf den Webseiten der SPG: www.sps.ch

Annonce des prix de la SSP pour 2003

L'année prochaine la SSP attribuera à nouveau trois prix de Frs. 5'000.- chacun, à savoir:

- ◇ Le prix SSP offert par le centre de recherche ABB pour un travail de recherche d'une qualité exceptionnelle dans tout domaine de la physique
- ◇ Le prix SSP offert par l'entreprise IBM pour un travail de recherche d'une qualité exceptionnelle en physique de la matière condensée
- ◇ Le prix SSP offert par l'entreprise Phonak pour un travail de recherche d'une qualité exceptionnelle dans le domaine de la physique appliquée

La SSP aimerait saluer l'excellence d'un travail scientifique effectué par de jeunes physiciens ou physiciennes. Les travaux soumis à candidature doivent avoir été effectués en Suisse ou par des Suisses à l'étranger. L'évaluation portera sur l'originalité, l'importance et la qualité des travaux.

La candidature soumise à nomination doit être justifiée par écrit. Le travail doit avoir donné lieu à des publications dans des revues renommées ou avoir été acceptés pour publication. Le dossier de candidature doit comporter les documents suivants : une lettre de motivation, le curriculum vitae des auteurs, le travail proposé, éventuellement une lettre de recommandation et une liste de publications. Ces documents seront envoyés électroniquement en format "pdf" directement au président de la SSP :

jean-philippe.ansermet@epfl.ch

Délai: 1. Novembre 2002

Les prix seront distribués à la réunion annuelle de la SSP.

Le règlement des prix se trouve sur les pages Web de la SSP: www.sps.ch

2005 - World Year of Physics

The main purpose of WYP is to raise a worldwide public awareness for physics and more generally for physical sciences. The perception of physics and its importance in our daily life has decreased in the General Public to such a low level that the number of physics students in High Schools and Universities has dramatically declined over the past few years. In order to address this problem, it is important that the European and National Physical Societies become more active in sharing their visions and convictions about physics with politicians and the public in general. The great contributions of physics during the last centuries to the development of Science and Technology and its impact on our society might be evident to us physicists, but not to everybody. At the dawn of the 21st century the interdisciplinary role of physics will further increase and help in solving crucial problems arising in our world such as energy production, environmental protection or public health.

The choice of the year 2005 as "WYP" refers to the 100th anniversary of the "Miraculous Year" of Albert Einstein, when he wrote his legendary articles which turned out to be the basis of three fundamental fields in physics: theory of relativity, quantum theory, theory of Brownian motion. Albert Einstein, who can be viewed as the first "international" physicist of the 20th century, realised most of his research work in Switzerland, Germany and the USA. Einstein, the physicist and the man, being so famous in the general public, will be the emblematic "flag" for this World Year of Physics.

What could be the main axes of the World Year of Physics?

- Promotion of public understanding of physics and physical sciences
- Teaching in physics
- Physics as basis of many other disciplines and incubator for newly emerging scientific and technological fields
- The great challenges of physics for the 21st century.

List of possible actions to be planned for WYP:

- Local and itinerant exhibits on physics and its achievements
- Local events on physics in every day life
- integration to existing cultural events
- Actions in schools, universities, national and private research laboratories
- Interdisciplinary conferences, workshops or symposia (mathematics, chemistry, biology...)
- Interaction with local industry, technology parks etc.
- Advertising material for WYP: articles in newspapers and specialized magazines, posters in public areas and transportation systems (train, buses, airlines), emission of special stamps, etc.
- Special logo
- Special programmes on national and local TV's and radios
- Publication of a WYP newsletter, regular articles in Europhysics News, as well as in the bulletins of National Physical Societies
- WYP web sites with updated information and forums.
- One of the highlights of year 2005 should be the 13th General Conference of the European

Physical Society, EPS13, which should be organized in Bern or Zürich, where A. Einstein was working during the year 1905.

- Others

To secure the success of these events, the full support of national governments and of international organisations like the European Union or UNESCO is needed. For the preparation of this important event, EPS asks every National Physical Society to establish a specific "2005-WYP" committee and deliberates on the type of actions that they want to launch at the scientific and political level. EPS heavily relies on the efficient and fast action in each country. Any feedback in terms of ideas, specific plans and comments is very welcome and should be addressed to the EPS Secretariat directly by email to epscommunications@uha.fr.

Martial Ducloy, EPS President; Christophe Rossel, Executive Secretary

Ausschreibung PRIX MEDIA SANW 2002

Auszeichnung für publizistische Arbeiten über naturwissenschaftliche Themen, dotiert mit 10'000 Franken.

Die Ausschreibung 2002 des "Prix Media SANW" richtet sich an journalistische Arbeiten (Text / Bild / Ton), die über Zeitungen, Zeitschriften, Radio, Fernsehen, Internet oder vergleichbare Medien an ein breites Publikum gelangen. Ausgeschlossen sind Arbeiten, die sich an ein ausschliesslich wissenschaftliches Publikum richten oder aus dem Bereich der kommerziellen oder politisch motivierten Werbung kommen. Ebenfalls ausgeschlossen sind Ausstellungen und Kampagnen, für die ein spezieller SANW-Preis in Vorbereitung ist.

- Die Veröffentlichung der Arbeit darf nicht länger als ein Jahr zurückliegen (Stichtag 1. Januar 2001).
- Die Arbeiten müssen sich vor allem an ein schweizerisches Publikum wenden und in mindestens einer der vier Landessprachen verfasst sein.
- Grundsätzlich zeichnet der «Prix Media SANW» nicht Personen aus, sondern Arbeiten. In Betracht kommen sowohl punktuelle Arbeiten als auch Serien, von einer Einzelperson oder einer Gruppe. Diese können von den AutorInnen selbst oder durch eine Körperschaft der SANW eingereicht werden.
- Die Preissumme für den "Prix Media SANW" beträgt 10'000 Franken.
- Anmeldefrist ist der 30. Juni 2002 (Poststempel)

Weitere Auskunft: <http://www.sanw.ch/root/docs/prixmedia.d.html>

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Revisorenbericht 2001



Revisorenbericht zur Jahresrechnung 2001

Die Jahresrechnung 2001 der SPG wurde von den unterzeichneten Revisoren geprüft und mit den Belegen in Übereinstimmung befunden.

Die Revisoren empfehlen der Generalversammlung der SPG, die Jahresrechnung zu genehmigen und den Kassier mit bestem Dank für die gute Rechnungsführung zu entlasten.

Für die SPG:

Der Präsident:

Dr. Th. A. Jung

Der Quästor:

Dr. G. Francz

Für die Revisoren der SPG:

Prof. Dr. P. Aebi

Dr. A. Pochelon

Basel, Fribourg und Lausanne,

15. Februar 2002

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NN

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Die SPG Mitteilungen erscheinen ca. 2 mal jährlich und werden an alle Mitglieder sowie weitere Interessierte abgegeben.

Verlag und Redaktion:

Schweizerische Physikalische Gesellschaft

Klingelbergstr. 82, CH-4056 Basel

sps@unibas.ch, www.sps.ch

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