25th ANNIVERSARY

epl

1986–2011

ISSN 0295-5075

A Letters Journal Exploring the Frontiers of Physics

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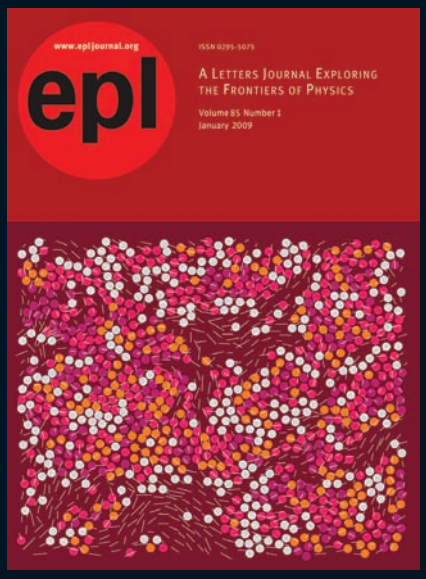
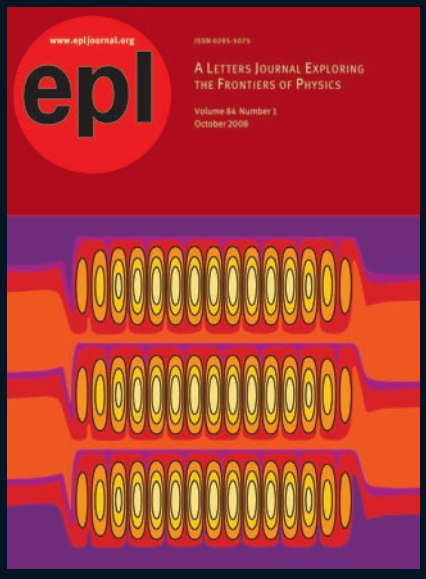
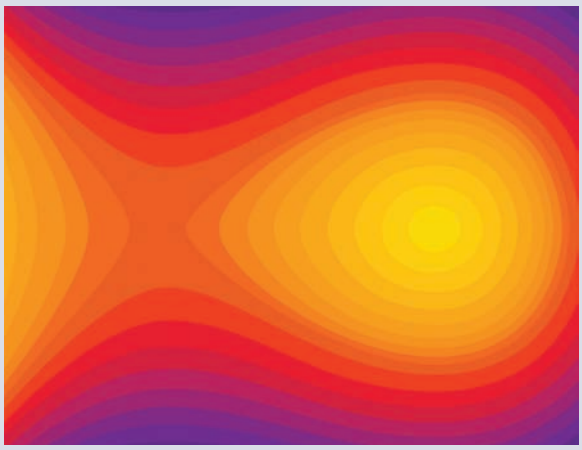


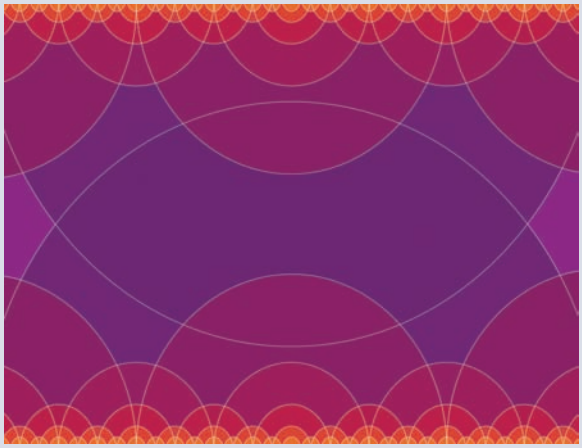


Cover images

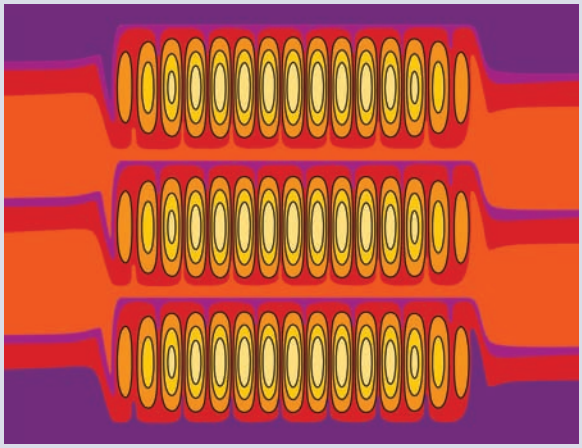
Dynamical heterogeneities in granular media at the jamming transition (adapted from **F Lechenault *et al*** 2008 *EPL* **83** 46003; artistic impression by Frédérique Swist).



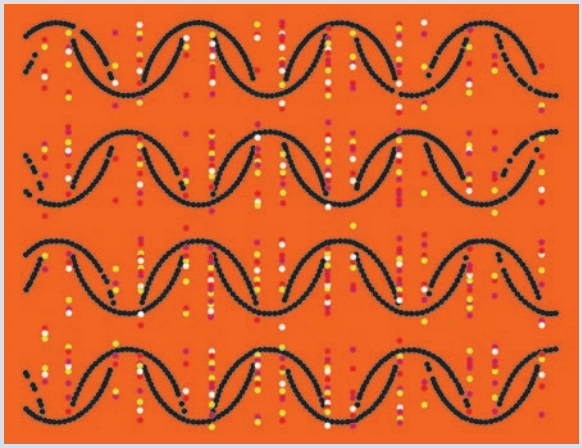
Phase-space portrait of possible ionic waves propagating along microtubules (adapted from **A. Priel and J. A. Tuszyński** 2008 *EPL* **83** 68004; artistic impression by Frédérique Swist).



Combining the small-world properties of a lattice backbone and long-range links, these regular networks obtain predictable properties from a recursive design that is easy to manufacture (adapted from **S. Boettcher and B. Gonçalves** 2008 *EPL* **84** 30002; artistic impression by Frédérique Swist).



Stable stationary roll patterns in supercritical convection structures due to concentration steps (adapted from **D Jung and M Lücke** 2007 *EPL* **80** 14002; artistic impression by Frédérique Swist).



Random walk with movement restricted by boundary conditions (adapted from **H. Ciftci and M. Cakmak** 2009 *EPL* **87** 60003; artistic impression by Frédérique Swist).

Potential energy surface for LiNC ⇋ LiCN accommodating superscarred wavefunctions (adapted from **S. D. Prado *et al*** 2009 *EPL* **88** 40003; artistic impression by Frédérique Swist).

25 YEARS OF EPL

In the Beginning…

After years of the most thorough discussions on the needs, the means, the structure, the people... during which the physics community of Europe through the EPS Divisions and the national societies has been fully consulted, EPS is able to formally announce the publication from 1 January 1986 of a new fortnightly journal:

Europhysics Letters
incorporating *Journal de Physique Lettres*
and *Il Nuovo Cimento Lettere*

With these words – published on the front page of the June 1985 issue of *Europhysics News* – the journal venture officially started.

The negotiations actually had been going on for five years. In fact the first proposal for a European Letters Journal had been formulated in 1980 under the EPS Presidency of Antonino Zichichi, and the final partnership agreement was signed in March 1985 under the Presidency of J. H. Stafford. The initiative was to reflect the collective European effort to harmonize physics publications in Europe to create a high-quality letters journal that would publish the best communications on new physics wherever it was done, be it Europe or worldwide.

In the 1980s the European scientific publication landscape was (and partly still is) quite fragmented and having just one flagship letters journal, a merger of two national letters journals, was seen as a good starting point towards a deeper unification.

Editor-in-Chief:
- N. Kurti, United Kingdom

Co-Editors:
- G. Barbiellini, Italy
- F. Bassani, Italy
- E. Brézin, France
- B. Cagnac, France
- J. Demaret, Belgium
- L. D. Faddeev, U.S.S.R.
- P. Fulde, Fed. Rep. Germany
- C. J. Joachain, Belgium
- M. Kaufmann, Fed. Rep. Germany
- T. W. B. Kibble, United Kingdom
- F. Mezei, Hungary
- R. H. Siemssen, The Netherlands
- J. P. Toennies, Fed. Rep. Germany
- G. Weber, Fed. Rep. Germany

Figure 1: First editorial board (1986)

Ownership

The partners that made the initial investment, i.e. the Société Française de Physique (SFP), the Società Italiana di Fisica (SIF) and the UK Institute of Physics (IOP), together with the European Physical Society (EPS) which provided the scientific background, were the initial owners and were supported from the start by several national societies that guaranteed further capital should this be needed.

The Publishers

Les Editions de Physique (now EDP Sciences), the publishing subsidiary of SFP, and the publishing section of SIF presented a joint proposal to the call for tenders and were awarded the contract for the publishing operation of the journal. EDP Sciences and SIF, which were respectively the publishers of the two merging journals, *Journal de Physique Lettres* and *Lettere al Nuovo Cimento*, mutually agreed to split the tasks as follows: editing, typesetting and pre-press services were carried out in Bologna (SIF); printing, dispatching and subscription services were handled in Paris (EDPS).

The Editorial Management

The scientific control was undertaken by EPS: the Editor-in-Chief and the Co-Editors were chosen by EPS in consultation with the other owners. Figure 1 shows the composition of the first Editorial Board. The Editorial Office, managing all editorial steps from paper submission to acceptance, was installed at EPS, whose headquarters were in Geneva at that time.

The Management Board (now Board of Directors)

The business management of the journal was carried out by the Management Board. Each of the four initial partners nominated one member to the Management Board, and the EPS delegate acted as the Chairman of the Board. The first Management Board was: W. Buckel (EPS), F. Read (IOP), J. Des Cloizeaux (SFP-EDPS), and A. Taroni (SIF). The Executive Secretary of EPS, G. Thomas (acting as the journal business manager) and the Editor-in-Chief of the journal, N. Kurti, were non-voting members of the Management Board.

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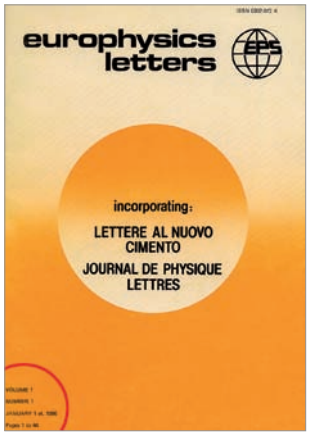

Figure 2: Cover of the first issue, 1986.

- The Austrian Physical Society
- The German Physical Society
- The Hungarian Physical Society
- Institute "Ruder Boskovic"
- The Netherlands Physical Society
- The Portuguese Physical Society
- Pool of Scandinavian Physical Societies:
  - Danish Physical Society
  - Finnish Physical Society
  - Icelandic Physical Society
  - Norwegian Physical Society
  - Swedish Physical Society
- The Swiss Physical Society
- The Turkish Society

Figure 3: Partners Societies (1988).

Figure 4: The cover design from 1997.

Growth

Europhysics Letters was launched as scheduled on 1 January 1986 (figure 2 shows the cover of the first issue) and contributions began to come in steadily, filling the issues as scheduled. One of the main challenges of the journal was to attain a high scientific standard and reputation but, as one can guess, no less challenging was the complexity of the project. The main publishing tasks were in fact split among three partners based in three different European countries: France, Italy and Switzerland. In the light of current technology this may seem like no great problem, but in 1986 communications were only by telephone and the exchange of material was only through surface mail: no fax, no e-mail, no electronic file exchange. Every step required perfect coordination, high professionalism and great experience to keep production times at competitive levels. But the people involved in this "complex system", i.e. Christina Bouldin, as Staff Editor in Geneva, myself, as Production Editor in Bologna and Jeanne Berger as Publications Director in Paris, assisted by Susan Mckie, immediately synchronized to the same wavelength and the operation went very smoothly from the start.

Papers began to come in with increasing regularity and the journal was quickly fledged. Circulation was very healthy at the outset, reaching in the first year almost 1000 library subscriptions, in tune with the projections of the publication contract.

By the end of 1986 the unexpected success of the journal forced the management to print more pages than allowed by the contract. But the continuation of this success and the increasing inflow of papers created a huge backlog (a major problem for a letters journal) that was partly alleviated by printing an extra volume at the end of 1987. Nevertheless, since the cost could not be recovered from the subscriptions income, the owners resolved to use the guarantee capital provided by the associated members, who were then asked to become full partners. A new partnership agreement was signed accordingly at Dresden in March 1988. Under the new agreement the ownership also changed, with the new societies holding the same share as each of the initial owners. The new partner societies (figure. 3) had the right to elect one delegate to the Management Board, raising the membership to five.

A new period started in a true, positive European spirit with 17 countries participating in the journal, perfectly in line with the aim of the project.

Maturity

In 1991 the number of accepted papers was greater than in any of the first five years. Again, to keep the acceptance-to-publication times at the required standard, the decision was taken to publish the final (quarterly) volume of 1991 on a weekly basis, rather than semimonthly, so that it was completed in October, while the first volume of 1992 was anticipated by two months, retaining the weekly periodicity until the backlog was eliminated. Since it was clear that the journal was steadily growing, from 1993 the frequency was changed to three issues per month.

But the 1990s will be remembered as the years of revolutionary innovation that deeply affected the scientific publishing landscape: the internet and online publication. Since the physics community pioneered this change, physics journals were the first to switch to the new technologies. So, in 1995 a new production contract that included also an online version was negotiated between EDPS and SIF and in January 1996 EDPS began to host and distribute on its website an electronic version of the journal. This change also coincided with a slow but steady decline in subscriptions – a general phenomenon affecting all scientific publishers. Fortunately, the new production technologies were less expensive, so any loss in income could be balanced by a decrease in costs.

Throughout the 1990s the manuscript inflow showed a small decline, and since the frequency of the issues was no longer so important, in mid-1997 the journal reverted to a semimonthly frequency. This was accompanied by a change in the cover design (see figure 4).

Figure 5: The first cover (volume 77) of the rebranded *EPL* (2007).

In 1995 another important change occurred. The Council of the EPS, for financial reasons, decided to move the EPS Secretariat from Geneva to Mulhouse. The EPS President, H. Schopper, offered the Management Board of EPL the opportunity to move the EPL Secretariat at the same time, but to begin with this offer was declined. As a result of the movement of the EPS Secretariat to Mulhouse at the end of 1996, the EPL Editorial Office remained isolated in Geneva and the EPL organization lost its institutional umbrella. Thus it became necessary to form an independent association with the mission of promoting the advancement of physics in Europe and worldwide. The EPL Association (EPLA) which mirrored the existing partnership was founded and the articles of the new association were signed by all the partners in Geneva in March 1997. EPLA is currently run in accordance with that document.

At the beginning of the millennium, the EPLA management (the Board of Directors) decided that the Geneva office was becoming too expensive and made a call for tenders for the EPL Editorial Office. All four founding partners submitted their offers, but the then EPS President, M. Ducloy, urged the Board of Directors to make the more politically convenient choice, i.e. to have the Editorial Office back at the EPS Secretariat in Mulhouse. That solution was accepted by the Board of Directors and in January 2004 the Editorial Office was installed in Mulhouse.

The Relaunch

At the turn of the century it was clear that the journal was relatively stable both in size and impact while traditional subscriptions continued to decline. At the same time, it was also clear that electronic journals were superseding print journals, which were increasingly serving only archival purposes.

As a consequence, new and more flexible distribution channels, such as electronic-only subscription packages, consortia, pricing by size of institution etc., began to emerge.

In 2004 the EPLA management undertook a brainstorming session to analyse the status of the journal and to discuss possible ways to increase its prestige, visibility and distribution. It was decided that EPL needed a clearer definition of its marketing strategy and that the production process should be redefined and streamlined. A new production contract which took into account the changing environment of journal publishing and incorporated the strategies for growth and development of the journal should be established.

IOP, SFP and SIF were invited to tender an offer for production either separately or jointly. Since none of the submitted bids reached the required majority, the Board of Directors called for a meeting of the Presidents of the founding members to seek guidance on how to resolve the stalemate. The presidents of the respective societies, M. Huber (EPS), Sir J. Enderby (IOP), E. Brezin (SFP), G .F. Bassani (SIF), who attended the summit, proposed a solution that would include all three partners, in line with the spirit of EPL. The challenge was to identify an equitable and mutually satisfactory task redistribution that exploited each partner's specific expertise. It took long negotiation and the true spirit of collaboration of IOP, SFP, and SIF, but the challenge was met and the new contract was signed in Bologna in February 2006.

The journal was relaunched in January 2007 with a new format and a new cover, as shown in figure 5. All that follows is recent history. I can only add that I take pride in having witnessed this extremely successful European venture.

Happy 25th anniversary EPL!

Angela Oleandri
(SIF Editorial Director and Member
of the EPLA Board of Directors)

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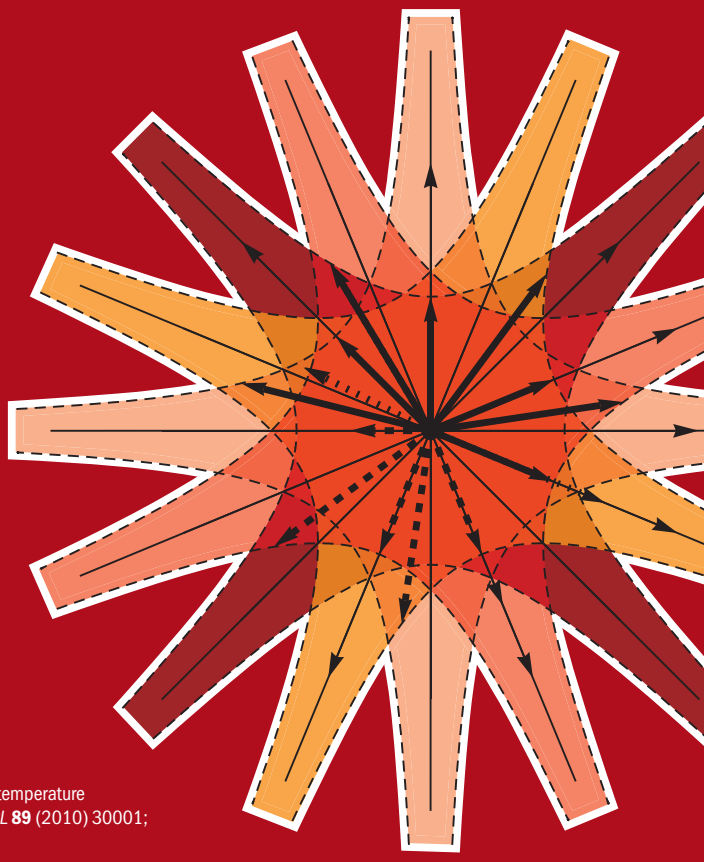

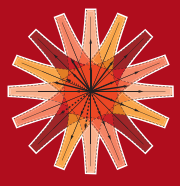

Image: Ornamental multiplication of space-time figures of temperature transformation rules (adapted from T. S. Bíró and P. Ván *EPL* **89** (2010) 30001; artistic impression by Frédérique Swist).

Random networks of automata: a simple annealed approximation

B. Derrida and Y. Pomeau

Service de Physique Théorique, CEN Saclay, 91191 Gif-sur-Yvette Cedex, France

Abstract

Kauffman's model is a random complex automata where nodes are randomly assembled. Each node σ_i receives K inputs from K randomly chosen nodes and the values of σ_i at time $t + 1$ is a random Boolean function of the K inputs at time t. Numerical simulations have shown that the behaviour of this model is very different for $K > 2$ and $K \leq 2$. It is the purpose of this work to give a simple annealed approximation which predicts $K = 2$ as the critical value of K. This approximation gives also quantitative predictions for distances between iterated configurations. These predictions agree rather well with the numerical simulations. A possible way of improving this annealed approximation is proposed.

PACS numbers: 05.40.-a

B. Derrida and Y. Pomeau 1986 Europhys Lett **1** 45

Experimental evidence for a photon anticorrelation effect on a beam splitter: a new light on single-photon interferences

P. Grangier, G. Roger and A. Aspect[1]

Institut d'Optique Théorique et Appliquée, B.P. 43 – F 91406 Orsay, France

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Abstract

We report on two experiments using an atomic cascade as a light source, and a triggered detection scheme for the second photon of the cascade. The first experiment shows a strong anticorrelation between the triggered detections on both sides of a beam splitter. This result is in contradiction with any classical wave model of light, but in agreement with a quantum description involving single-photon states. The same source and detection scheme were used in a second experiment, where we have observed interferences with a visibility over 98%.

PACS numbers: 42.10 42.50.-p 42.25.Bs

P. Grangier et al 1986 Europhys Lett **1** 173

Susceptibility measurements support high-T_c superconductivity in the Ba-La-Cu-O system

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Abstract

The magnetic susceptibility of ceramic samples in the metallic BaLaCuO system has been measured as a function of temperature. This system had earlier shown characteristic sharp drops in resistivity at low temperatures. It is found that, for small magnetic fields of less than 0.1 T, the samples become diamagnetic at somewhat lower temperatures than the resistivity drop. The highest-temperature diamagnetic shift occurs at (33 ± 2) K, and may be related to shielding currents at the onset of percolative superconductivity. The diamagnetic susceptibility can be suppressed with external fields of 1 to 5 T.

PACS numbers: 74.70.-b 74.10.+v

J. G. Bednorz et al 1987 Europhys Lett **3** 379

Active transmission channels and universal conductance fluctuations

Y. Imry

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IBM Research Center – Yorktown Heights, NY, 10598 USA

Abstract

The transport through a segment of a disordered system is determined by the eigenvalues of a large random matrix. The effectively independent active transmission channels are associated with these eigenvalues which are closest to unity. A decreasing number of those survives when the system's length increases. They determine the conductance and its fluctuations, which are found to be independent, within broad limits, of the size, disorder and nature of the system. This universality is due to the strong correlations in the spectra of large random matrices, providing a new insight on and generalizing the extremely interesting recent results of Altschuler, Lee and Stone.

PACS numbers: 72.10.-d

Y. Imry 1986 Europhys Lett **1** 249

Presumption for a quantum energy gap in the quasi-one-dimensional $S = 1$ Heisenberg antiferromagnet $Ni(C_2H_8N_2)_2NO_2(ClO_4)$

J. P. Renard[1], M. Verdaguer[1,5], L. P. Regnault[3], W. A. C. Erkelens[3,6], J. Rossat-Mignod[3] and W. G. Stirling[4]

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[2] Laboratoire de Spectrochimie des éléments de transition, CNRS UA 420, Université Paris-Sud, 91405 Orsay, France

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[5] ENS, Le Parc, 92211 – Saint-Cloud, France

[6] Kamerlingh Onnes Laboratory, University of Leiden, The Netherlands

Abstract

Magnetic susceptibility and inelastic neutron scattering experiments have been performed in the nearly ideal one-dimensional Heisenberg antiferromagnet with spin one, $Ni(C_2H_8N_2)_2NO_2ClO_4$. The experimental results are consistent with the recent theoretical predictions for a quantum energy gap between the ground state and the first excited states.

PACS numbers: 75.10.Jm 75.50.Ee

J. P. Renard et al 1987 Europhys Lett **3** 945

Superconductivity in alcaline-earth-substituted La_2CuO_4: a theoretical model

J. Labbé and J. Bok

Groupe de Physique des Solides de l'Ecole Normale Supérieure – 24, rue Lhomond, 75231 Paris Cedex 05, France

Abstract

We propose a two-dimensional (2D) band structure calculation for alcaline-earth-substituted La_2CuO_4 in the tetragonal phase. We find a degenerate logarithmic singularity in the electronic density of states, as usual in 2D systems. This leads to an orthorhombic-to-tetragonal structural phase transition (SPT). Using the BCS theory, we calculate the superconducting critical temperature T_c as a function of the position of the Fermi level (i.e. Cu^{+++}/Cu^{++} ratio). This model explains the high T_c's observed experimentally and the relation between superconductivity and SPT.

PACS numbers: 74.10.+v 74.20.Fg

J. Labbe and J. Bok 1987 Europhys Lett **3** 1225

Atomic resolution with atomic force microscope

G. Binnig[1], Ch. Gerber[1], E. Stoll[1], T. R. Albrecht[2] and C. F. Quate[2]

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Abstract

The atomic force microscope (AFM) is a promising new method for studying the surface structure of both conductors and insulators. In mapping a graphite surface with an insulating stylus, we have achieved a resolution better than 2.5 Å.

PACS numbers: 68.35.-p 68.60.Bs

G. Binnig et al 1987 Europhys Lett **3** 1281

Structure of the 100 K superconductor $Ba_2YCu_3O_7$ between (5 ÷ 300) K by neutron powder diffraction

J. J. Capponi[1], C. Chaillout[1], A. W. Hewat[2], P. Lejay[3], M. Marezio[1,4], N. Nguyen[5], B. Raveau[5], J. L. Soubeyroux[2], J. L. Tholence[3] and R. Tournier[3]

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[5] Laboratoire CRISMAT, I.S.M.Ra. Université de Caen, 14032 Caen Cédex, France

Abstract

Recently Siegrist *et al.* proposed a structure for a high-T_c superconductor $Ba_2YCu_3O_{(9-\delta)}$ based on an orthorhombic ($a = a_p$, $b = a_p$, $c = 3a_p$) perovskitelike model containing Ba and Y cations ordered over the *A*-sites of the ABO_3 structure. This ordering is responsible for the tripling of the *c*-axis. Half of the oxygen vacancies (at $z = 1/2$) are ordered, while the other half (at $z = 0$) are disordered over two sites. Using profile refinement of high-resolution neutron powder data at six different temperatures between 5 K and 300 K, we have refined the structure of a pure and well-characterised powder sample with onset of superconductivity at 100 K. At all temperatures we confirmed the previous model except that in our structure, all oxygen vacancies are ordered. Two-thirds of the copper cations have a pyramidal coordination and one-third has a square coordination. In our structure all squares are parallel to the (*b, c*)-plane, while in the one reported by Siegrist et al. the squares are disorderedly parallel to either the (*a, c*)- or (*b, c*)-plane. The difference between the two models is probably due to the fact that the single crystal used in the earlier work was highly twinned. Empirical calculations of the copper valences show that the Cu^{+++} cations are almost equally distributed over the two sites. No structural change has been detected at the transition.

PACS numbers: 74.70.-b 61.12.-q

J. J. Capponi et al 1987 Europhys Lett **3** 1301

An exactly solvable asymmetric neural network model

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[2] Dept. of Phys., University of Edinburgh – Edinburgh EH9 3JZ, UK

[3] IFF der KFA Julich, Postfach 1913 – 5170 Julich, Germany

Abstract

We consider a diluted and nonsymmetric version of the Little-Hopfield model which can be solved exactly. We obtain the analytic expression of the evolution of one configuration having a finite overlap on one stored pattern. We show that even when the system remembers, two different configurations which remain close to the same pattern never become identical. Lastly, we show that when two stored patterns are correlated, there exists a regime for which the system remembers these patterns without being able to distinguish them.

PACS numbers: 05.40.-a 05.50.+q

B. Derrida et al 1987 Europhys Lett **4** 167

The neutron halo of extremely neutron-rich nuclei

P. G. Hansen[1,3] and B. Jonson[2]

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[2] Department of Physics, Chalmers University of Technology, Göteborg, Sweden

[3] Institute of Physics, University of Aarhus, Denmark

Abstract

Empirical evidence suggests that neutron pairing plays an important role for the stability of nuclei near the neutron drip line. It is shown that the low binding of these nuclei will lead to a neutronization of the nuclear surface and possibly to large cross-sections for Coulomb dissociation, which then offers a new way to study clusters and their binding energies.

PACS numbers: 21.10.Ft 21.10.Dr 25.70.-z

P. G. Hansen and B. Jonson 1987 Europhys Lett **4** 409

Recurrence plots of dynamical systems

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[2] IHES, F-91440 Bures-sur-Yvette, France

Abstract

A new graphical tool for measuring the time constancy of dynamical systems is presented and illustrated with typical examples.

PACS numbers: 05.40.-a

J.-P. Eckmann et al 1987 Europhys Lett **4** 973

A parabolic density profile for grafted polymers

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[3] Present address: Theory of Condensed Matter, Cavendish Laboratory, Madingley Road, Cambridge CB3 0HE, UK

Abstract

We study the statistics of a grafted polymer brush, consisting of a set of monodisperse chains in solution, each attached irreversibly by one end to a flat surface. We use a self-consistent field method, valid in the limit of weak excluded volume and at moderately high surface coverage. Exploiting the fact that the chains are highly stretched, we map the problem (in the long-chain limit) onto one involving the motion of classical particles in an equal-time potential, which we can solve exactly. The resulting density profile for the brush takes a parabolic form.

PACS numbers: 87.15.-v 36.20.-r 82.70.-y 81.65.-b

S. T. Milner et al 1988 Europhys Lett **5** 413

Unitary phase operator in quantum mechanics

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[2] Theoretical Physics Division, Harwell Laboratory, Oxfordshire OX11 ORA, UK

[3] Wolfson College, Oxford OX2 6UD, UK

Abstract

The difficulties in formulating a natural and simple operator description of the phase of a quantum oscillator or single-mode electromagnetic field have been known for some time. We present a unitary phase operator whose eigenstates are well-defined phase states and whose properties coincide with those normally associated with a phase. The corresponding phase eigenvalues form only a dense subset of the real numbers. A natural extension to the definition of a time-measurement operator yields a corresponding countable infinity of eigenvalues.

PACS numbers: 42.50.-p 03.70.+k 03.65.-w

D. T. Pegg and S. M. Barnett 1988 Europhys Lett **6** 483

Magnetoresistance oscillations in a two-dimensional electron gas induced by a submicrometer periodic potential

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[2] Walter-Schottky-Institut, TUM, D-8046 Garching, Germany

Abstract

A new type of magnetoresistance oscillation periodic in $1/B$ is observed when the carrier density N_s of a two-dimensional electron gas is weakly modulated with a period smaller than the mean free path of the electrons. Experiments with high mobility AlGaAs-GaAs heterojunctions where N_s is modulated by holographic illumination at $T \leq 4.2$ K show that the period of the additional quantum oscillation is determined by the separation a of the interference fringes. This period corresponds to Shubnikov-de Haas oscillations where only the electrons within the first reduced Brillouin zone with $|k| < \pi/a$ contribute.

PACS numbers: 72.20.My

D. Weiss et al 1989 Europhys Lett **8** 179

Lattice gas dynamics with enhanced collisions

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Abstract

An efficient strategy is developed for building suitable collision operators, to be used in a simplified version of the lattice gas Boltzmann equation. The resulting numerical scheme is shown to be linearly stable. The method is applied to the computation of the flow in a channel containing a periodic array of obstacles.

PACS numbers: 05.40.-a 61.20.Ja 47.27.-i

F. J. Higuera et al 1989 Europhys Lett **9** 345

Boltzmann approach to lattice gas simulations

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Abstract

An alternative simulation procedure is proposed for lattice hydrodynamics, based on the lattice Boltzmann equation instead of on the microdynamical evolution. The averaging step, used by the latter method to derive macroscopic quantities, is suppressed, as well as the associated fluctuations. The collision operator is expressed in terms of its linearized part, and condensed into a few parameters, which can be selected, independently of a particular collision rule, to decrease viscosity as much as desired.

PACS numbers: 47.10.-g 02.70.-c 51.10.+y

F. J. Higuera and J. Jimenez 1989 Europhys Lett **9** 663

Generating transferable tight-binding parameters: application to silicon

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Department of Mathematics, Imperial College – Queen's Gate, London SW7 2BZ

Abstract

We present a novel method of obtaining transferable tight-binding parameters. The method is applied to Si and new parameters extracted by rescaling the energy functional in a physically transparent manner. Self-consistency is approximated within the tight-binding model by enforcing atomic charge neutrality using a simple algorithm. Results for bulk Si and Si clusters are presented and are seen to agree well with results from accurate *ab initio* calculations.

PACS numbers: 61.50.Lt

L. Goodwin et al 1989 Europhys Lett **9** 701

Calculation of 2ν and 0ν double-beta decay rates

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Abstract

2ν and 0ν double-beta decay rates for all potential ββ emitters with $A \geq 70$ are predicted. The nuclear transition matrix elements are calculated within the QRPA with a realistic effective nucleon-nucleon interaction. The results for neutrinoless decays are rather insensitive to details of the nuclear structure, except for the cases of ^{70}Zn, ^{100}Mo and ^{148}Nd.

PACS numbers: 23.40.Hc 21.60.Jz 23.40.-s

A. Staudt et al 1990 Europhys Lett **13** 31

Growth with surface diffusion

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Abstract

A simple growth model is investigated where particles are deposited onto a substrate randomly and subsequently relax into a position nearby where the binding is strongest. In space dimension $d = 2$ the surface roughness exponent and the dynamical exponent are $\xi = 1.4 \pm 0.1$ and $z = 3.8 \pm 0.5$. These values are larger than for previous models of sedimentation or ballistic deposition and are surprisingly close to the ones obtained from a linear generalized Langevin equation for growth with surface diffusion. A scaling relation $2\xi = z - d + 1$ is proposed to be valid for a large class of growth models relevant for molecular beam epitaxy.

PACS numbers: 05.40.-a 05.70.Ln 68.55.-a

D. E. Wolf and J. Villain 1990 Europhys Lett **13** 389

Single-electron pump based on charging effects

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Service de Physique de l'Etat Condensé, Centre d'Etudes de Saclay, 91191 Gif-sur-Yvette, France

Abstract

We have designed and operated a device consisting of three nanoscale tunnel junctions biased below the Coulomb gap. Phase shifted r.f. voltages of frequency f applied to two gates "pump" one electron per cycle through the device. This is shown experimentally by plateaus in the current-voltage characteristic at I = ± ef, the sign of the current depending on the relative phase of the r.f. voltages and not on the sign of the bias voltage.

PACS numbers:06.20.fb 73.40.Gk 73.40.Rw

H. Pothier et al 1992 Europhys Lett **17** 249

Lattice BGK models for Navier-Stokes equation

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Abstract

We propose the lattice BGK models, as an alternative to lattice gases or the lattice Boltzmann equation, to obtain an efficient numerical scheme for the simulation of fluid dynamics. With a properly chosen equilibrium distribution, the Navier-Stokes equation is obtained from the kinetic BGK equation at the second-order of approximation. Compared to lattice gases, the present model is noise-free, has Galileian invariance and a velocity-independent pressure. It involves a relaxation parameter that influences the stability of the new scheme. Numerical simulations are shown to confirm the speed of sound and the shear viscosity.

PACS numbers: 51.10.+y 47.27.-i 02.70.-c

Y. H. Qian et al 1992 Europhys Lett **17** 479

Long-range correlation and partial $1/f^{\alpha}$ spectrum in a noncoding DNA sequence

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[3] Physics Department, Rockefeller University, 1230 York Avenue, New York, NY 10021, USA

Abstract

Mutual information function, which is an alternative to correlation function for symbolic sequences, and a "symbolic spectrum" are calculated for a human DNA sequence containing mostly intron segments, those that do not code for proteins. It is observed that the mutual information function of this sequence decays very slowly, and the correlation length is extremely long (at least 800 bases). The symbolic spectrum of the sequence at very low frequencies can be approximated by $1/f^{\alpha}$, where f is the frequency and α ranges from 0.5 to 0.85. It is suggested that the existence of the repetitive patterns in the sequence is mainly responsible for the observed long-range correlation. A possible connection between this long-range correlation and those in music notes is also briefly discussed.

PACS numbers: 02.50.-r 87.10.+e

W. Li and K. Kaneko 1992 Europhys Lett **17** 655

Structural phase transitions in the fullerene C_{60}

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2 School of Chemistry and Molecular Sciences, University of Sussex, Brighton BN1 9QJ, UK

Abstract

High-resolution powder neutron diffraction has been used to study the crystal structure of the fullerence C_{60} in the temperature range 5 K to 320 K. Solid C_{60} adopts a cubic structure at all temperatures. The experimental data provide clear evidence of a continuous phase transition at ca. 90 K and confirm the existence of a first-order phase transition at 260 K. In the high-temperature face-centred-cubic phase ($T > 260$ K), the C60 molecules are completely orientationally disordered, undergoing continuous reorientation. Below 260 K, interpretation of the diffraction data is consistent with uniaxial jump reorientation principally about a single $\langle 111 \rangle$ direction. In the lowest-temperature phase ($T < 90$ K), rotational motion is frozen although a small amount of static disorder still persists.

PACS numbers: 33.15.Bh 64.70.Kb

W. I. F. David et al 1992 Europhys Lett **18** 219

Simulating microscopic hydrodynamic phenomena with dissipative particle dynamics

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Abstract

We present a novel method for simulating hydrodynamic phenomena. This particle-based method combines features from molecular dynamics and lattice-gas automata. It is shown theoretically as well as in simulations that a quantitative description of isothermal Navier-Stokes flow is obtained with relatively few particles. Computationally, the method is much faster than molecular dynamics, and the at same time it is much more flexible than lattice-gas automata schemes.

PACS numbers: 51.10.+y 02.70.-c

P. J. Hoogerbrugge and J. M. V. A. Koelman 1992 Europhys Lett **19** 155

Simulated tempering: a new Monte Carlo scheme

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Abstract

We propose a new global optimization method (Simulated Tempering) for simulating effectively a system with a rough free-energy landscape (i.e., many coexisting states) at finite nonzero temperature. This method is related to simulated annealing, but here the temperature becomes a dynamic variable, and the system is always kept at equilibrium. We analyse the method on the Random Field Ising Model, and we find a dramatic improvement over conventional Metropolis and cluster methods. We analyse and discuss the conditions under which the method has optimal performances.

PACS numbers: 05.20.-y 77.22.Jp

E. Marinari and G. Parisi 1992 Europhys Lett **19** 451

Phase behaviour of colloid + polymer mixtures

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[4] Also at University of Edinburgh, Department of Physics, Mayfield Road, Edinburgh, EH9 3JZ, UK

Abstract

A new treatment of the phase behaviour of a colloid + non-adsorbing polymer mixture is described. The calculated phase diagrams show marked polymer partitioning between coexisting phases, an effect not considered in the usual effective-potential approaches to this problem. The authors also predict that under certain conditions an area of three-phase coexistence should appear in the phase diagram.

PACS numbers: 82.70.-y 64.75.+g

H. N. W. Lekkerkerker et al 1992 Europhys Lett **20** 559

Superconductivity, spin gaps and Luttinger liquids in a class of cuprates

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Abstract

A homologous series of cuprates can be formed by introducing a parallel array of planar defects into the infinite-layer cuprate, $SrCuO_2$. In each CuO_2 plane line defects consisting of CuO double chains result. Analysis of the electronic properties of such planes is demonstrated. When lightly doped with holes the spin gap will remain and singlet superconductivity should occur on a separate but high temperature scale. This prediction may shed new light on the origin of the separate energy scales for the spin gap and superconductivity in other lightly doped cuprates.

PACS numbers: 74.10.+v 75.10.Jm

T. M. Rice et al 1993 Europhys Lett **23** 445

Interatomic potentials from first-principles calculations: the force-matching method

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[2] International School for Advanced Studies (SISSA-ISAS) Via Beirut 4, I-34014 Trieste, Italy

[3] Department of Materials Science and Engineering, University of Illinois, 105 S. Goodwin Ave., Urbana, IL 61801, USA

Abstract

We present a new scheme to extract numerically "optimal" interatomic potentials from large amounts of data produced by first-principles calculations. The method is based on fitting the potential to *ab initio* atomic forces of many atomic configurations, including surfaces, clusters, liquids and crystals at finite temperature. The extensive data set overcomes the difficulties encountered by traditional fitting approaches when using rich and complex analytic forms, allowing to construct potentials with a degree of accuracy comparable to that obtained by *ab initio* methods. A glue potential for aluminium obtained with this method is presented and discussed.

PACS numbers: 64.70.Dv 34.20.-b 61.50.Lt

F. Ercolessi and J. B. Adams 1994 Europhys Lett **26** 583

Size-dependent depression of the glass transition temperature in polymer films

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[2] Pembroke College – Cambridge CB2 1RF, UK

Abstract

The glass transition temperature of thin polystyrene films has been measured as a function of film thickness. It is found that the glass transition decreases in temperature as the thickness of the film is reduced. The effect is not strongly molecular-weight dependent, ruling out chain confinement as the major cause; instead we suggest that at the surface of the glassy film a liquidlike layer exists whose size diverges as the glass transition temperature is approached from below.

PACS numbers: 64.70.Pf 68.15.+e

J. L. Keddie et al 1994 Europhys Lett **27** 59

Stability and band gap constancy of boron nitride nanotubes

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Department of Physics, University of California at Berkeley Materials Sciences Division, Lawrence Berkeley Laboratory – Berkeley, CA 94720, USA

Abstract

Extensive LDA and quasi-particle calculations have been performed on boron nitride (BN) single-wall and multi-wall nanotubes. Strain energies are found to be smaller for BN nanotubes than for carbon nanotubes of the same radius, owing to a buckling effect which stabilizes the BN tubular structure. For tubes larger than 9.5 Å in diameter, the lowest conduction band is predicted to be free-electron-like with electronic charge density localized inside the tube. For these tubes, this band is at constant energy above the top of the valence band. Consequently, contrarily to carbon nanotubes, single- and multi-wall BN nanotubes are constant-band-gap materials, independent of their radius and helicity. In addition, we expect them to exhibit remarkable properties under *n*-type doping.

PACS numbers: 71.10.-w 36.20.Kd

X. Blase et al 1994 Europhys Lett **28** 335

Periodically rocked thermal ratchets

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Institut für Theoretische Physik, Universität Augsburg, Memmingerstr. 6, D-86135 Augsburg, Germany

Abstract

We consider overdamped Brownian particles in anisotropic, periodic structures (ratchets) that are rocked periodically. Together with the periodic forcing, white thermal noise can generate a non-zero, macroscopic velocity. By tuning the parameters, the direction of the current can be reversed. Additionally, the current as a function of the driving amplitude exhibits several local maxima at finite driving frequencies. For zero thermal noise, the deterministic current assumes an intriguing structure, reflecting the complex dynamics of particle excursions along the ratchet.

PACS numbers: 05.40.-a

R. Bartussek et al 1994 Europhys Lett **28** 459

Statistical mechanics of dissipative particle dynamics

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[2] Unilever Research Port Sunlight Laboratory Quarry Road East, Bebington, Wirral, L63 3JW, UK

[3] Permanent address: Departamento de Física Fundamental, UNED, Apartado 60141, 28080 Madrid, Spain

Abstract

The stochastic differential equations corresponding to the updating algorithm of Dissipative Particle Dynamics (DPD), and the corresponding Fokker-Planck equation are derived. It is shown that a slight modification to the algorithm is required before the Gibbs distribution is recovered as the stationary solution to the Fokker-Planck equation. The temperature of the system is then directly related to the noise amplitude by means of a fluctuation-dissipation theorem. However, the correspondingly modified, discrete DPD algorithm is only found to obey these predictions if the length of the time step is sufficiently reduced. This indicates the importance of time discretisation in DPD.

PACS numbers: 51.10.+y 02.70.-c

P. Espanol and P. Warren 1995 Europhys Lett **30** 191

Superparamagnetic-like behavior in an octanuclear iron cluster

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[4] Knox College – Gatesburg, IL 61401, USA

Abstract

Using high-frequency EPR spectroscopy we have found that a cluster comprising eight iron(III) ions, Fe_8, which is essentially flat, has a ground $S = 10$ state and an Ising-type anisotropy. For the first time both ac susceptibility and Mössbauer spectroscopy could be used in order to monitor the relaxation time of the magnetization, which was found to follow a thermally activated behavior, as in a superparamagnet, with $\tau_0 = 1.9 \times 10^{-7}$ s and an energy barrier of 22.2 K. The set of data allowed us to conclude that the origin of the anisotropy in nanosize molecular clusters is associated with the single ion contributions and not with the shape of the clusters.

PACS numbers: 76.30.-v 76.80.+y

A.-L. Barra et al 1996 Europhys Lett **35** 133

Pearl drops

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[2] Saint-Gobain Recherche - 39 quai Lucien-Lefranc 93303 Aubervilliers Cedex, France

Abstract

If deposited on a hydrophobic rough substrate, a small drop of water can look like a pearl, with a contact angle close to 180 degrees. We examine the conditions for observing such a phenomenon and show practical achievements where the contact angle can be predicted and thus quantitatively tuned by the design of the surface microstructure.

PACS numbers: 68.15.+e

J. Bico et al 1999 Europhys Lett **47** 220

Roughness-induced non-wetting

S. Herminghaus

Abteilung Angewandte Physik, Universität Ulm – D-89069 Ulm, Germany

Abstract

It is shown that a certain class of self-affine profiles of surface roughness may render any substrate with a non-zero microscopic contact angle non-wet, i.e., give it a macroscopic contact angle close to 180 degrees. This is in some contrast to previous work and not only of potential applicational interest, but may also contribute to the amazing water repellency of some plant leaves.

PACS numbers: 68.35.c+

S. Herminghaus 2000 Europhys Lett **52** 165

A new heavy-fermion superconductor $CeIrIn_5$: a relative of the cuprates?

C. Petrovic[1,2], R. Movshovich[1], M. Jaime[1], P. G. Pagliuso[1], M. F. Hundley[1], J. L. Sarrao[1], Z. Fisk[1,2] and J. D. Thompson[1]

[1] Condensed Matter and Thermal Physics, Los Alamos National Laboratory Los Alamos, NM 87545, USA

[2] National High Magnetic Field Laboratory, Florida State University Tallahassee, FL 32306, USA

Abstract

$CeIrIn_5$ is a member of a new family of heavy-fermion compounds and has a Sommerfeld specific-heat coefficient of 720 mJ/molK^2. It exhibits a bulk, thermodynamic transition to a superconducting state at T_c = 0.40 K, below which the specific heat decreases as T^2 to a small residual T-linear value. Surprisingly, the electrical resistivity drops below instrumental resolution at a much higher temperature T_0 = 1.2 K. These behaviors are highly reproducible and field-dependent studies indicate that T_0 and T_c arise from the same underlying electronic structure. The layered crystal structure of CeIrIn5 suggests a possible analogy to the cuprates in which spin/charge pair correlations develop well above T_c.

PACS numbers: 74.70.Tx 71.27.+a

C. Petrovic et al 2001 Europhys Lett **53** 354

Superconductivity at 25 K in hole-doped $(La_{1-x}Sr_x)OFeAs$

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National Laboratory for Superconductivity, Institute of Physics and Beijing National Laboratory for Condensed Matter Physics, Chinese Academy of Sciences – P.O. Box 603, Beijing 100080, PRC

Abstract

By partially substituting the tri-valence element La with di-valence element Sr in LaOFeAs, we introduced holes into the system. For the first time, we successfully synthesized the hole-doped new superconductors $(La_{1-x}Sr_x)OFeAs$. The maximum superconducting transition temperature at about 25 K was observed at a doping level of x=0.13. It is evidenced by Hall effect measurements that the conduction in this type of material is dominated by hole-like charge carriers, rather than electron-like ones. Together with the data of the electron-doped system $La(O_{1-x}F_x)FeAs$, a generic phase diagram is depicted and is revealed to be similar to that of the cuprate superconductors.

PACS numbers: 74.20.Mn 74.10.+v 74.70.Dd

Hai-Hu Wen et al 2008 Europhys Lett **82** 17009

Superconductivity in the iron-based F-doped layered quaternary compound $Nd[O_{1-x}F_x]FeAs$

Zhi-An Ren, Jie Yang, Wei Lu, Wei Yi, Xiao-Li Shen, Zheng-Cai Li, Guang-Can Che, Xiao-Li Dong, Li-Ling Sun, Fang Zhou and Zhong-Xian Zhao

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Abstract

Here we report a new quaternary iron-arsenide superconductor $Nd[O_{1-x}F_x]FeAs$, with the onset resistivity transition at 51.9 K and Meissner transition at 51 K. This compound has the same crystal structure as LaOFeAs, and becomes the second superconductor after $Pr[O_{1-x}F_x]FeAs$ that superconducts above 50 K.

PACS numbers: 74.70.Dd 74.10.+v

Zhi-An Ren et al 2008 Europhys Lett **82** 57002

Competing orders and spin-density-wave instability in $La(O_{1-x}F_x)FeAs$

J. Dong, H. J. Zhang, G. Xu, Z. Li, G. Li, W. Z. Hu, D. Wu, G. F. Chen, X. Dai, J. L. Luo, Z. Fang and N. L. Wang

Beijing National Laboratory for Condensed Matter Physics, and Institute of Physics, Chinese Academy of Sciences – Beijing 100190, China

Abstract

The interplay between different ordered phases, such as superconducting, charge or spin ordered phases, is of central interest in condensed-matter physics. The very recent discovery of superconductivity with a remarkable T_c=26 K in Fe-based oxypnictide $La(O_{1-x}F_x)FeAs$ (see Kamihara Y. *et al., J. Am. Chem. Soc.*, **130** (2008) 3296) is a surprise to the scientific community and has generated tremendous interest. The pure LaOFeAs itself is not superconducting but shows an anomaly near 150 K in both resistivity and dc magnetic susceptibility. Here we provide combined experimental and theoretical evidences showing that a spin-density-wave (SDW) state develops at low temperature, in association with electron Nematic order. The electron-doping by F suppresses the SDW instability and induces the superconductivity. Therefore, the $La(O_{1-x}F_x)FeAs$ offers an exciting new system showing competing orders in layered compounds.

PACS numbers: 74.25.Jb 74.70.-b 75.30.Fv

J. Dong et al 2008 Europhys Lett **83** 27006

Observation of Fermi-surface–dependent nodeless superconducting gaps in $Ba_{0.6}K_{0.4}Fe_2As_2$

H. Ding[1], P. Richard[2], K. Nakayama[3], K. Sugawara[3], T. Arakane[3], Y. Sekiba[3], A. Takayama[3], S. Souma[2], T. Sato[3], T. Takahashi[2,3], Z. Wang[4], X. Dai[1], Z. Fang[1], G. F. Chen[1], J. L. Luo[1] and N. L. Wang[1]

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[2] WPI Research Center, Advanced Institute for Material Research, Tohoku University – Sendai 980-8577, Japan

[3] Department of Physics, Tohoku University – Sendai 980-8578, Japan

[4] Department of Physics, Boston College – Chestnut Hill, MA 02467, USA

Abstract

We have performed a high-resolution angle-resolved photoelectron spectroscopy study on the newly discovered superconductor $Ba_{0.6}K_{0.4}Fe_2As_2$ (T_c=37 K). We have observed two superconducting gaps with different values: a large gap ($\Delta \sim 12$ meV) on the two small hole-like and electron-like Fermi surface (FS) sheets, and a small gap (~6 meV) on the large hole-like FS. Both gaps, closing simultaneously at the bulk transition temperature (T_c), are nodeless and nearly isotropic around their respective FS sheets. The isotropic pairing interactions are strongly orbital dependent, as the ratio $2\Delta/k_BT_c$ switches from weak to strong coupling on different bands. The same and surprisingly large superconducting gap due to strong pairing on the two small FSs, which are connected by the (π, 0) spin-density-wave vector in the parent compound, strongly suggests that the pairing mechanism originates from the inter-band interactions between these two nested FS sheets.

PACS numbers: 79.60.-I 74.25.Jb 74.70.-b

H. Ding et al 2008 Europhys Lett **83** 47001

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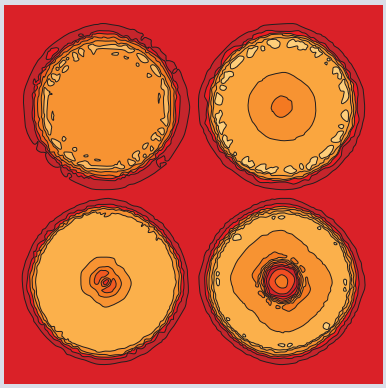
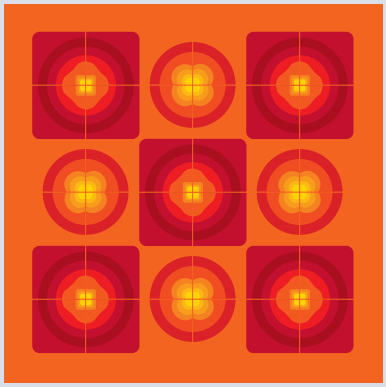
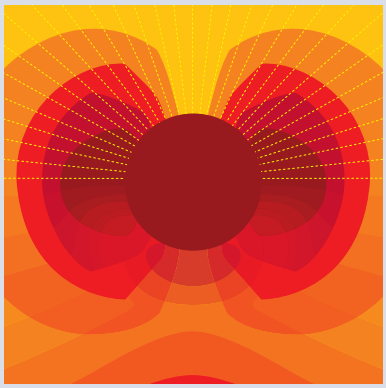


Biaxial strain on lens-shaped quantum rings of different inner radii, adapted from **Zhang *et al*** 2008 EPL **83** 67004.



Artistic impression of electrostatic particle–particle interactions in dielectrophoresis, adapted from **N Aubry and P Singh** 2006 *EPL* **74** 623.



Artistic impression of velocity and normal stress profiles around a sphere that moves through a polymer solution, adapted from **R Tuinier, J K G Dhont and T-H Fan** 2006 *EPL* **75** 929.

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