

CURRICULUM VITAE

Evgeni E. Kolomeitsev

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- **Employment:**

1993 – 97 Scientific research employee,
Institute for Nuclear and Hadronic Physics,
Research Center Rossendorf,
Dresden, Germany
Head: Prof. E. Grosse

1997 – 2000 Postdoctoral position,
Gesellschaft für Schwerionenforschung (GSI),
Darmstadt, Germany
Head of Department: Prof. W. Nörenberg

2000 – 2002 Postdoctoral position
**European Centre for Theoretical Studies in
Nuclear Physics and Related Areas (ECT*)**
Director: Prof. W. Weise

2002 – Assistant Professor
Niels Bohr Institute
Director: Prof. A.D. Jackson

- **Degrees:**

1993 Diploma of Physics (M.S. in Physics), "Pion and K^+ Production
via Direct Reaction in Heavy-Ion Collisions",
Moscow Engineering Physical Institute, Moscow, Russia,
Advisor: Prof. D.N. Voskresensky
Graduated with Distinction

1997 Ph.D. in Physics, "Kaons in Nuclear Matter",
Institute of Theoretical Physics, Technical University Dresden,
Dresden, Germany,
Advisor: Prof. G. Soff
Graduated with Distinction (*summa cum laude*)

- **Education:**

1987 – 93 Moscow Engineering Physical Institute,
Moscow, Russia

1993 – 97 Institute for Theoretical Physics, Technical University Dresden,
Dresden, Germany

- **Professional activity:**

Co-organization of the weekly Nuclear Theory Seminar
at the Niels Bohr Institute (September 2002–present)

Co-organization of the International Workshop
"Transport Theories for Heavy-Ion Reactions",
ECT*, Trento, Italy, May 2003

- **Professional associations:**

German Physical Society (DPG)

RESEARCH PROJECTS of Evgeni E. Kolomeitsev

■ Pion production in heavy-ion collisions. (1992–93)

We analyze various processes of pion production in dense and hot nuclear matter created in heavy-ion collisions at energies up to 2 GeV pro nucleon. We calculate differential cross sections of π^- production in direct $NN \rightarrow NN\pi^-$ reactions, taking into account a modification of nucleon–nucleon interactions in nuclear matter due to softening of pionic degrees of freedom. It is shown that pions with momenta ~ 300 MeV are produced predominantly through the Δ resonance intermediate state. Comparison of the results with experimental data on pion production indicates that the pion absorption is strong and increases with the temperature and density. At the initial state of a heavy-ion collision, almost all pions are confined inside the system. The soft pions (with momenta $\lesssim 200$ MeV) can be radiated at some intermediate state of heavy-ion collision, whereas the harder pions are released together with nucleons at the final stage of collision.

Coauthor: D.N. Voskresensky

■ Kaon polarization in nuclear matter. (1994)

We derive polarization operators of K^\pm , K^0 , and \bar{K}^0 mesons in nuclear matter with arbitrary isospin composition. Besides the s-wave kaon–nucleon interaction obtained within the chiral perturbation theory, we include the p-wave kaon–nucleon interaction through the $\Lambda(1116)$ and $\Sigma(1195)$ hyperon states as well as the kaon interaction with the virtual pions and kaon fluctuations. The p-wave kaon–nucleon–hyperon interaction generates new low-energy excitation modes in spectra of K^- and \bar{K}^0 mesons. The presence of these modes can induce interesting consequences for neutron star physics. It allows for a condensation of K^- mesons with a finite momentum and for a first-order phase transition of a neutron star to a proton-enriched star with a K^- condensate.

Coauthors: D.N. Voskresensky and B. Kämpfer

■ K^- production in heavy-ion collisions. (1994–95)

We investigate an impact of a kaon polarization in nuclear matter on the K^- yield in intermediate-energy heavy-ion collisions. We are particularly interested in manifestations of low-energy hyperon–nucleon-hole modes of the K^- spectrum. A relation between observed K^+ and K^- yields is derived. The calculated differential K^- cross sections are compared with available experimental data at various collision energies. The in-medium effects can modify the K^- yields by factors 2 to 5 at beam energies between 2 and 1 AGeV. This leads to a good agreement of theoretical calculations with experimental data.

Coauthors: D.N. Voskresensky and B. Kämpfer

■ Dense pion gas with a Bose-Einstein condensate. (1995)

Properties of a hot and dense pion gas created in ultra-relativistic heavy-ion collisions are studied in the framework of the Weinberg model for the pion-pion interaction. We take into account a possibility for Bose–Einstein condensation and calculate the spectrum of over-condensate excitations. We consider properties of kaons in the presence of a pion condensate. The K^- effective mass is found to substantially increase, whereas K^+ effective mass to decreases in the presence of a condensate. These peculiarities may manifest themselves in momentum distributions of produced kaons.

Coauthor: D.N. Voskresensky

■ Cooling of neutron stars via the massive-photon decay. (1995)

We investigate decay reactions of massive photons into neutrino–anti-neutrino pairs occurring in neutron star matter. The induced charge of neutrinos is determined by electron–electron-hole and proton–proton-hole intermediate states. The investigated processes are operative in hot neutron stars in the region of proton pairing where the photon acquires an effective mass due to the Higgs–Meissner effect. This effective mass is considerably smaller than the corresponding plasma frequency determined by relativistic electrons. We calculate the contribution of these reactions to the neutrino emissivity and found that it can exceed the contribution of standard URCA processes with account of the nucleon pairing in the temperature range 10^9 – 10^{10} K.

Coauthors: D.N. Voskresensky and B. Kämpfer

■ **Hot and dense gas of pions with a finite chemical potential. (1995–96)**

We consider dense and hot pion system with a dynamically fixed particle number. Such a system could be created in ultra-relativistic heavy-ion collisions since the rate of inelastic processes responsible for chemical equilibrium drops considerably faster than the rate of elastic processes which hold the system in thermal equilibrium. The pion-pion interaction we describe by the leading-order Weinberg's chiral Lagrangian. For a system with an arbitrary isospin composition we calculate polarization operators of π^+ , π^- and π^0 mesons within the self-consistent Hartree approximation. We find that the effective in-medium pion gap depends sensitively on the density and the temperature and exceeds both the free pion mass and the corresponding value for the pion gas in chemical equilibrium. We discuss also the possibility for a Bose-Einstein condensation of pions.

Coauthors: D.N. Voskresensky and B. Kämpfer

■ **Current algebra approach to the kaon-nucleon scattering. (1996–98)**

We develop an approach to determine dependence of the kaon-nucleon scattering amplitude on energies and momenta of kaons, being off their vacuum mass shell. We use the reduction formula for the scattering amplitude, the SU(3) algebra relations for hadronic currents and PCAC. No assumption on the smoothness of matrix elements of currents and fields is done *a priori*, otherwise smoothness violated processes are explicitly pointed out. The kaon-nucleon scattering amplitude is presented as composition of pole and regular parts. In the pole part we take into account contributions of $\Lambda(1116)$ and $\Sigma(1190)$ intermediate states, having p-wave coupling to the kaon-nucleon system, the $\Lambda(1405)$ resonance with the s-wave coupling, and contributions from the 3/2-spin resonances $\Sigma^*(1328)$ and $\Lambda^{**}(1520)$. In the regular part of the amplitude, the Weinberg-Tomazawa and Σ - terms are explicitly written out together with contributions of other processes collected in coefficients of a series expansion with respect to kinematical invariants. These coefficients are adjusted to reproduce experimental data on the kaon-nucleon scattering.

■ **Strangeness modes in nuclei tested by anti-neutrinos. (1998)**

Production of negative strangeness in reactions of inelastic anti-neutrino scattering on a nucleus provides information about modifications of strange degrees of freedom in nuclear matter. We calculate cross-sections of reactions $\bar{\nu}_{e(\mu)} \rightarrow e^+(\mu^+) + K^-$ and $\bar{\nu}_{e(\mu)} + p \rightarrow \Lambda + e^+(\mu^+)$ and investigate their sensitivity to medium effects. We consider effects induced by the presence of low-energy excitation modes in the K^- spectrum, and a renormalization of weak interactions in medium. We discuss the double counting problem, which could arise in calculation of in-medium processes. We show how this problem can be avoided when various contributions to anti-neutrino scattering are classified with the help of the optical theorem, formulated within the non-equilibrium Green's function technique.

Coauthor: D.N. Voskresensky

■ **Chiral approach to the kaon-nucleon scattering. (1998–1999)**

The K^-N scattering nearby the threshold is characterized by the non trivial threshold dynamics of the inelastic channels $\pi\Sigma$, $\pi\Lambda$, etc. We develop the fully relativistic approach to solution of a coupled channel problem. The elementary interaction among different channels is derived from the SU(3) chiral Lagrangian and includes nearby the contact Weinberg-Tomazawa and Σ -terms also hyperon pole terms. Constrained to experimental data on K^-N elastic and inelastic scattering in the wide energy interval this approach provide a reliable basis for detailed description of kaon dynamics in medium.

Coauthor: M. Lutz

■ **Covariant unitary approach to meson-baryon scattering. (2000)**

We successfully used the relativistic chiral SU(3) Lagrangian to establish a unified description of pion-nucleon, kaon-nucleon and antikaon-nucleon scattering describing a large amount of empirical scattering data including the axial vector coupling constants for the baryon octet ground states. In the course of developing our scheme we constructed a projector formalism which decouples in the Bethe-Salpeter equation covariant partial wave amplitudes and also suggested a minimal chiral subtraction scheme within dimensional regularization which complies manifestly with the chiral counting rules. We derived the Bethe-Salpeter interaction kernel to chiral order Q^3 To reduce the

number of free parameters in the chiral Lagrangian we consider the number of colors (N_c) in QCD as a large parameter and performing a systematic $1/N_c$ expansion of the interaction kernel. The chiral SU(3) flavor symmetry is found to be an extremely useful and accurate tool. Explicit symmetry breaking effects are quantitatively important but sufficiently small to permit an evaluation within chiral perturbation theory.

Coauthor: M. Lutz

■ **Φ mesons from a hadron gas. (2000-2001)**

We have studied distributions of ϕ mesons in heavy-ion collisions at SPS energies reconstructed via hadronic K^+K^- and dilepton l^+l^- decay channels. The analysis of ϕ meson mean free path allows to suppose that ϕ mesons decouple from the hadronic system at somewhat earlier stage before the common breakup of the hadronic fireball. Therefore, kaon pairs originated from the ϕ decays inside a fireball can be rescattered or absorbed. Such kaon pairs will not contribute to a ϕ meson reconstruction, whereas the leptonic probes can leave a fireball freely. We derive the expressions for the apparent momentum distribution of ϕ mesons in kaonic and muonic channels respectively. The increase of the ϕ meson width in medium provides a mechanism for strong suppression of the kaonic detection channel due to the enhancement of ϕ decay probability inside a fireball increasing thus rescattering of daughter kaons. The final net relative suppression factor of kaon channel to muon channel ~ 0.3 . This value is close to experimental observations at CERN SPS. We have found that reconstructed rapidity distributions of ϕ mesons become effectively wider, if in-medium properties of mesons and rescattering of kaons are taken into account.

Coauthor: P. Filip

■ **Strange particle-hole modes in neutron star. (2001)**

A kaon condensation in neutron stars is considered. We show that close to the critical point of a s-wave kaon condensation the derivative of the kaon spectrum with respect to momentum can be negative. This opens a possibility that a p-wave kaon condensation occurs prior an s-wave condensation. The strong p-wave attraction is provided by the $\Lambda(1116)$, $\Sigma(1195)$ and $\Sigma^*(1385)$ exchanges. The coupling constants and the p-wave background contribution are taken from the recent combined analyzes of kaon-nucleon and pion-nucleon scattering. The short-range correlations are taken into account. The correlation parameters are estimated.

Coauthor: D.N. Voskresensky

■ **Non-perturbative description of the Φ meson in nuclear matter. (2001-2003)**

The propagation of transverse and longitudinal ϕ -mesons is considered in cold nuclear matter. We evaluate the coupling of the ϕ -meson to a pair of kaons where in-medium spectral kaon densities, which were obtained previously in a covariant and self consistent chiral SU(3) approach, are used. Particular emphasis is put on the proper evaluation of the vertex correction terms which receive significant contributions from the hyperon ground and hyperon resonance states $\Sigma(1385)$ and $\Lambda(1405)$.

Coauthor: M. Lutz

■ **Resonance states below pion-nucleon threshold and their consequences for nuclear systems. (2002)**

Regular sequences of narrow peaks have been observed in the missing mass spectra in the reactions $pp \rightarrow p\pi^+X$ and $pd \rightarrow ppX_1$ below pion-production threshold. They are interpreted in the literature as manifestations of supernarrow light dibaryons, or nucleon resonances, or light pions forming resonance states with the nucleon in its ground state. We discuss how existence of such exotic states would affect properties of nuclear systems. We show that the neutron star structure is drastically changed in all three cases. We find that in the presence of dibaryons or nucleon resonances the maximal possible mass of a neutron star would be smaller than the observational limit. Presence of light pions does not contradict the observed neutron star masses. Light pions allow for the existence of extended nuclear objects of arbitrary size, bound by strong and electromagnetic forces.

Coauthor: D.N. Voskresensky

■ **Chiral dynamics of deeply bound pionic atoms. (2002)**

We present a systematic calculation, based on two-loop chiral perturbation theory, of the pion-nuclear s-wave optical potential. A proper treatment of the explicit energy dependence of the off-shell pion self-energy together with (electromagnetic) gauge invariance of the Klein-Gordon equation turns out to be crucial. Accurate data for the binding energies and widths of the $1s$ and $2p$ levels in pionic Pb and Sn isotopes are well reproduced, and the notorious "missing repulsion" in the pion-nuclear s-wave optical potential is accounted for. The connection with the in-medium change of the pion decay constant is clarified.

Coauthor: N. Kaiser and W. Weise

■ **Chiral SU(3) dynamics and resonances. (2003)**

We study meson and baryon resonances as generated by coupled-channel dynamics in terms of the chiral SU(3) Lagrangian. At leading order parameter-free predictions for the scattering of Goldstone bosons off any meson or baryon multiplet are obtained. In the (u, d, s) -sector of QCD the resulting spectra for baryon resonances with $J^P = 1/2^-$, $J^P = 3/2^-$ and meson resonances with $J^P = 1^+$ is discussed. Further results concern the scattering of Goldstone bosons off heavy-light pseudo-scalar and vector mesons. The recently announced narrow open charm states observed by the BABAR and CLEO collaborations are reproduced. We suggest the existence of states that form an anti-triplet and a sextet representation of the SU(3) group. In particular, so far unobserved narrow isospin-singlet states with negative strangeness are predicted. In the charm baryon sector we study the scattering of Goldstone bosons off heavy-light baryon resonances with $J^P = 1/2^+$. The three states $\Lambda_{c1}(2593)$, $\Lambda_{c0}(2880)$ and $\Xi_{c1}(2790)$ discovered by the CLEO collaboration are recovered. We suggest the existence of resonance states that form an anti-quintet, two sextet and two anti-triplet representations of the SU(3) group. In particular, narrow states with anomalous isospin (I) and strangeness (S) quantum numbers (I,S)=(1/2,+1) are anticipated.

Coauthor: M.F.M. Lutz

LIST OF PUBLICATIONS
by Evgueni E. Kolomeitsev

- [1] D.N. Voskresensky and E.E. Kolomeitsev,
Direct reactions with pion production in nucleus-nucleus collisions,
Yad. Fiz. **56** (1993) 192 [Phys. At. Nucl. **56** (1993) 252].
- [2] D.N. Voskresensky and E.E. Kolomeitsev,
Direct reactions involving pion production in hot nuclear matter,
Yad. Fiz. **58** (1995) 132 [Phys. At. Nucl. **58** (1995) 126].
- [3] E.E. Kolomeitsev, D.N. Voskresensky, and B. Kämpfer,
Kaon polarization in nuclear matter,
Nucl. Phys. A **588** (1995) 889.
- [4] E.E. Kolomeitsev and D.N. Voskresensky,
Bose-Einstein condensation of pions in ultrarelativistic nucleus-nucleus collisions and the spectra of kaons,
Yad. Fiz. **58** (1995) 2195 [Phys. At. Nucl. **58** (1995) 2082].
- [5] E.E. Kolomeitsev, D.N. Voskresensky, and B. Kämpfer,
The impact of kaon polarization in nuclear matter on the K^- production in heavy-ion collisions,
Int. J. Mod. Phys. E **5** (1996) 316 (CERN-SCAN-9507219).
- [6] E.E. Kolomeitsev, D.N. Voskresensky, and B. Kämpfer,
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Acta Physica Polonica B27 (1996) 3263.
- [7] E.E. Kolomeitsev,
Kaonen in Kernmaterie,
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URL: http://www.physik.tu-dresden.de/publik/1998/diss_kolomeitsev.ps
- [8] D.N. Voskresensky, E.E. Kolomeitsev, and B. Kämpfer,
The role of the massive photon decay channel for the neutrino cooling of neutron stars,
Zh. Eksp. Theor. Phys. **114** (1998) 385 [Sov. J. JETP **87** (1998) 211].
- [9] E.E. Kolomeitsev and D.N. Voskresensky,
Strangeness modes in nuclei tested by anti-neutrinos,
Phys. Rev. C **60** (1999) 034610.
- [10] E.E. Kolomeitsev and D.N. Voskresensky,
Particle-hole dynamics,
in "Progress in Nonequilibrium Green's functions", M. Bonitz (Ed.), World Scientific Publ., Singapore 2000, p. 330,
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- [11] M.F.M. Lutz and E.E. Kolomeitsev,
Effective chiral theory of kaon-nucleon scattering
Proc. Int. Workshop XXVII on Gross Properties of Nuclei and Nuclear Excitations
Hirschegg, Austria, Jan 16-22 (2000) 117,
e-print: nucl-th/0004021
- [12] P. Filip and E.E. Kolomeitsev,
Phi mesons from a hadronic fireball
Phys. Rev. C **64** (2001) 054905
e-print: hep-ph/0107288

- [13] M.F.M. Lutz and E.E. Kolomeitsev,
Relativistic chiral $SU(3)$ symmetry, large N_c sum rules and meson-baryon scattering
Nucl. Phys. A **700** (2002) 193 e-print: nucl-th/0105042
- [14] M.F.M. Lutz and E.E. Kolomeitsev,
Covariant meson-baryon scattering with chiral and large N_c constraints
Foundation of Physics **31** (2001) 1671
e-print:nucl-th/0105068,
- [15] M.F.M. Lutz and E.E. Kolomeitsev,
The χ -BS(3) approach
 π N Newsletters 16 (2002) 346
e-print: nucl-th/0110045,
- [16] M.F.M. Lutz, E.E. Kolomeitsev and C.L. Korpa,
Chiral $SU(3)$ symmetry and Strangeness
J. Phys. G **28** (2002) 1729
e-print: nucl-th/0112053
- [17] E.E. Kolomeitsev and P. Filip
Resonances from a hadronic fireball
J. Phys. G **28** (2002) 1697
e-print: hep-ph/0112252
- [18] E.E. Kolomeitsev and M.F.M. Lutz
A Unified Chiral Approach to Meson-Nucleon Interaction
Proceedings of Int. Conf. Baryon 2002, Jefferson Lab, Newport News, March 2002
- [19] E.E Kolomeitsev, N. Kaiser and W. Weise
Chiral Dynamics of Deeply Bound Pionic States
Phys. Rev. Lett. **90** (2003) 092501
e-print: nucl-th/0207090
- [20] E.E. Kolomeitsev and D.N. Voskresensky
Resonance states below pion-nucleon threshold and their consequences for nuclear systems
Phys. Rev. C **67** (2003) 015805
e-print: nucl-th/0207091
- [21] E.E. Kolomeitsev and D.N. Voskresensky
Negative Kaons in Dense Baryonic Matter
Phys. Rev. C **68** (2003) 15803
e-print: nucl-th/0211052
- [22] E.E Kolomeitsev, N. Kaiser and W. Weise
Chiral dynamics and pionic $1s$ states of Pb and Sn isotopes
Nucl. Phys. A **721** (2003) 835
e-print: nucl-th/0211090
- [23] E.E Kolomeitsev and M.F.M. Lutz
On baryon resonances and chiral symmetry
GSI-Preprint-2003-17
e-print: nucl-th/0305101
- [24] M.F.M. Lutz and E.E Kolomeitsev
On meson resonances and chiral symmetry
GSI-Preprint-2003-19
e-print: nucl-th/0307039
- [25] E.E Kolomeitsev and M.F.M. Lutz
On heavy-light meson resonances and chiral symmetry
GSI-Preprint-2003-20
e-print: hep-ph/0307133

- [26] M.F.M. Lutz and E.E Kolomeitsev
On charm baryon resonances and chiral symmetry
GSI-Preprint-2003-23
e-print: hep-ph/0307233

TALKS AT CONFERENCES, SUMMER SCHOOLS, WORKSHOPS
by **Evgeni E. Kolomeitsev**

1. **Workshop "Nuclear and Particle Physics 1994"**
Pirna, Germany, October 4, 1994
"Kaon Polarization in Nuclear Matter"
2. **Workshop "Gross Properties of Nuclei and Nuclear Excitations"**
Hirschegg, Austria, January 15–21 1995
"Kaons in Nuclear Matter"
3. **Spring Meeting of German Physical Society,**
Köln, Germany, March 13–17, 1995
"Kaon Polarization in Nuclear Matter"
4. **International Summer School on Development in Nuclear Theory and Particle Physics,**
Dubna, Russia, August 4–18, 1995
"Kaons in Nuclear matter: from Heavy Ions to Neutron Stars"
5. **Spring Meeting of German Physical Society,**
Stuttgart, Germany, March 25–29 1996
"Pion Gas With the Fixed Number of Particles"
6. **Workshop "Meson' 96"**
Cracow, Poland, May 10–14, 1996,
"Hot and Dense Pion Gas With the Finite Chemical Potential"
7. **Spring Meeting of German Physical Society**
Göttingen, Germany, February 24–28, 1997
"Current Algebra Approach to Kaon–Nucleon Scattering"
8. **Workshop "Hadrons in Dense Matter"**
GSI Darmstadt, Germany, July 2–4, 1997
"Kaonic Excitations in Nuclear Matter [Low Energy Modes]"
9. **Workshop "Hadrons in Dense Matter"**
GSI Darmstad, Germany, July 17, 1998
"Anti-Kaon and Φ Meson in Nuclear Matter"
10. **Second Workshop on Kaon Production**
Research Center Rossendorf, December 10–11, 1998
"Kaonic Excitations in Heavy-Ion Collisions"
11. **Spring Meeting of German Physical Society**
Freiburg, Germany, March 22–26, 1999
"Strangeness modes in nuclei tested by anti-neutrinos"
12. **Workshop "Meson' 2000"**
Cracow, Poland, May 19–23, 2000,
"Chiral Theory of Kaon-Nucleon Scattering"
13. **Workshop "Nuclear Astrophysics"**
ECT*, Trento, Italy, June 19– July 7, 2000,
"Kaon Condensation and Realistic Kaon-Nucleon Interaction"
14. **International Conference Strangeness 2000**
Berkeley, USA, July 20–25, 2000,
"S and P wave nuclear kaon dynamics"

15. **Workshop "Strong Decays of Baryon Resonances"**
ECT*, Trento, Italy, January 29– February 2, 2001,
"Dynamically generated resonances"
16. **International Conference Strange Quark Matter 2001**
Frankfurt (Main), Germany, September 24–29, 2001,
"Phi mesons from a hadronic fireball"
17. **International Conference Baryons-2002**
Jefferson Lab (Newport News) USA, March 3–8, 2002,
" χ -BS(3): A Unified Chiral Approach to Meson-Nucleon Interaction"
18. **Workshop "Physics of Stellar Collapse and Neutron Stars"**
ECT*, Trento, Italy, October 29–31, 2002
"Pions in dense matter"
19. **International Workshop "Transport Theories for Heavy-Ion Reactions"**
ECT*, Trento, Italy, May 19–23, 2003
"Quantitative comparison of transport codes at GSI energies"
20. **International Conference on Selected Problems of Modern Physics**
JINR, Dubna, Russia, June 8–11, 2003
"Resonance states below pion-nucleon threshold in nuclear systems"
21. **X. International Conference on Hadron Spectroscopy: Hadron'03**
Aschaffenburg, Germany, September 1–6, 2003
"Chiral SU(3) dynamics and resonances "
22. **Meeting of Working Group "Hadrons and Nuclei"**
Meißen, Germany, September 8-11, 2003
"Chiral dynamics and open-charm resonances"
23. **International Workshop on Hadronic Atoms, "HADATOM'03"**
Trento, Italy, October 13-17, 2003
"Deeply bound pionic atoms"

INVITED SEMINARS
by **Evgeni E. Kolomeitsev**

1. UFR de Sciences Physiques,
Univeresité Louis Pasteur, Strasburg,
France, 20. May 1999 (invited by J. Polony)
"Strange Aspects of Nuclear Matter"
2. Nuclear Theory Group,
SUNY Stony Brook, USA, 2. August 1999 (invited by I. Zahed)
"Virtual Kaons"
3. Nuclear Theory Group,
Michigan State University, USA, July 2000 (invited by P. Danielewicz)
"Kaonic Excitations in Nuclear Matter"
4. Theory Group
Institute for Nuclear physics
University Mainz, Germany, Mai 2002 (invited by M. Vanderhaeghen)
" χ -BS(3): A Unified Chiral Approach to Meson-Nucleon Interaction"

REFERENCES

The letters of recommendation can be requested from the following persons:

Prof. Andrew D. Jackson

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