Curriculum Vitae

Family name:	Dr. Sailer
First name:	Kornél
Birth:	25 September 1951, Budapest (Hungary)
Citizenship:	Hungarian
Sex:	Male
Family status:	Unmarried
Affiliation:	Debrecen University Department for Theoretical Physics Poroszlay út 6/c, H-4032 Debrecen Hungary Phone: 00 36 (52) 415 102 Fax: 00 36 (52) 415 102 E-Mail: sailer@dtp.atomki.hu
Position:	assistant professor (1976-1989), Kossuth Lajos Univ. (Debrecen) associated professor (1989-2000), Kossuth Lajos Univ. (Debrecen) full professor (2000-), Debrecen Univ.(Debrecen) head of the Department for Theor. Phys. at the Debrecen Univ. (1991-), deputy of the dean for research at the Faculty of Science, Debrecen Univ. (2004-2005) dean of the Faculty of Science, Debrecen Univ. (2005-)
Carrier:	1976. Diploma in Physics (Kossuth Lajos Univ., Debrecen), 1981. Ph.D. in Physics (Kossuth Lajos Univ., Debrecen) 1995. Habilitation (Kossuth Lajos Univ., Debrecen) 2000. D.Sc. (in Physics) of the Hungarian Academy of Sciences
Fellowships:	1978-1981. Shevchenko University (Kiev, Ukrania; by Prof. V.K. Tartakovsky); 1987-1989. Humboldt-Fellowship, Goethe University (Frankfurt am Main, Germany; (by Profs. W. Greiner and B. Müller). 1998. Follow-up grant of the Humboldt Foundation, Goethe University (Frankfurt am Main, Germany; by Prof. W. Greiner) 2002. Follow-up grant of the Humboldt Foundation, Goethe University, (Frankfurt am Main, Germany; by Prof. W. Greiner). 2001- Regular visits in the Lab. for Theor. Physics, Pasteur Univ., Strasbourg (Prof. J. Polonyi)
Recent research interest:	Renormalisation group and its applications in quantum field theory, in statistical physics and for non-relativistic electron systems

Publications:	69 articles in refereed journals and monographs, 16 university scripts
Long-term research collaborations:	Inst. Theor. Physik, Univ. Frankfurt, Prof. W. Greiner (1990-2002) Lab. Phys. Theor., Pasteur Univ., Strasbourg, Prof. J. Polónyi (1994-) Inst. Theor. Phys., TU Dresden, Dresden, Prof. G. Soff† (1997-2004) ATOMKI Debrecen Dr. I. Nándori (2002-)

Research activity:

My research activity has been started with experimental low-energy neutron physics (neutron activation analysis). From that I made my diploma work (1976) and got the university doctor degree (1980). The determination of a few cross sections (in [2] of Conf. contributions) have got particularly good response (see V. McLane, C.L. Dunford, P.F. Rose, Neutron Cross Sections, Vol. 2, Neutron Cross Section Curves, Academic Press, Inc., Boston, 1988, pp. 167, 169, 176, 332, 335, 336).

As a research fellow at the Shevchenko State University I started to work in the field of theoretical nuclear physics. I made my Ph.D. thesis (1981) on the application of the eikonal approximation to intermediate energy collisions of nucleons and light nuclei on nuclei [5-9].

Later I changed my field of interest to high-energy nuclear physics. I took part in a project for the investigation of the phase-transition of hadronic matter in the framework of the Walecka model. We have shown that the anisotropy produced in heavy-ion collisions does not prevent pion-condensation and that pion-condensed nuclear matter is isotrop in thermal equilibrium [10,11]. Solutions to QCD with SU(2) color symmetry have been found in mean-field approximation, describing the gluon-condensed phase of quark-gluon plasma [13,14].

As a Humboldt-fellow (1987-1989) I started to develop the Dynamical String Model of high-energy hadronic processes in collaboration with the Frankfurt School. We have shown that numerical simulation of high-energy processes (hadronization in e^+e^- annihilation, proton-proton, proton-nucleus, and nucleus-nucleus collisions) can be based on the model. In the review paper [1] we outlined a program for studying several questions raised by the model along which I continued to work during almost a decade. Finally, we have shown in a Debrecen-Dresden-Frankfurt collaboration that the model provides an alternative to describe ultrarelativistic heavy-ion collisions [43]. Among many byproducts of this research [19,23-26,27,30,32,36,38] the determination of the transverse momentum distribution of (anti)quarks for pair-production in a chromoelectric flux tube [24] got good response (see SPIRES). Basicly for these results the D.Sc. title of the Hungarian Academy of Science was given me.

For around a decade I am involved in the research for the developing and applications of the renormalization group (RG) method in collaboration with Prof. J. Polonyi (Strasbourg), Dr. S.Nagy Debrecen Univ.) and Dr. I. Nándori (ATOMKI, Debrecen). In the framework of the functional RG using sharp momentum cut-off, we have shown that the blocking results in a linear transformation, the so-called operator mixing for composite operators, the interpretation of that transformation in terms of differential geometry enables one to identify the various scaling regions and the corresponding relevant operators [48]. In the framework of the internal-space RG we have derived evolution equations for the cut-off independent one- and two-particle irreducible effective actions of the one-component scalar field theory when the evolution is driven by the mass and

Research activity (cont.): The low-energy effective theories of sine-Gordon (SG) type models (SG model, massive SG model, layered SG model) have been investigated in detail, the IR scaling laws and their phase structure determined in the framework of functional RG methods (S. Nagy, I. Nándori). The well-known phase structure of the 2-dimensional SG model has been recovered by the determination of the RG flow of Wilson's blocked action, as well as by that of the sensitivity of IR dynamics on the microscopic (bare) parameters [44,62]. The phase structure of the 2-dimensional massive SG model has been determined and it was found to be in agreement in a particular case with the well-known phase structure of the bosonized version of 2-dimensional QED [60,63]. In the framework of both the Wegner-Houghton RG in the local potential approximation and the real-space RG in the dilute gas approximation, we determined the UV scaling laws of the Coulomb gas for the number of dimensions $d > 2$ [54]. It was shown that the vortex dynamics in magnetically coupled high-temperature superconductors can be described by the layered SG model when the mass matrix is chosen in an appropriate manner, the dependence of the phase-transition temperature on the number of layers has been found to agree with experimental results [64,66].

Selected publications (2002-2007):

1. I. Nándori, K. Sailer, U.D. Jentschura, and G. Soff, Renormalization of the periodic scalar field theory by Polchinski's renormalization group method, J. Phys. **G28** (2002)607-616.

2. J. Alexandre, J. Polonyi, and K. Sailer, Functional Callan-Symanzik equation for QED, hep-th/0111152; Phys.Lett. **B531** (2002)316

3. J. Polonyi, K. Sailer, EFFECTIVE ACTIONS AND THE DENSITY FUNCTIONAL THEORY, cond-mat/0108179; Phys. Rev. **B66**(2002)155113 (24 pages)

4. J. Polonyi, K. Sailer, Density-Dependent Effective Action for Electron Systems, Int. J. Quantum Chem. **92**(2003) 181-191.

5. I. Nándori, U. D. Jentschura, K. Sailer, and G. Soff, Renormalization-group analysis of the generalized sine-Gordon model and of the Coulomb gas for $d \geq 3$ dimensions, Phys. Rev. **D 69** (2004) 025004.

6. S. Nagy, J. Polonyi, K. Sailer, Periodic ground state for the charged massive Schwinger model, Phys. Rev.**D 70** (2004) 105023.

7. J. Polonyi, K. Sailer, Renormalization group in the internal space, hep-th/0410271, Phys. Rev. **D71** (2005) 025010,

8. I. Nandori, S. Nagy, K. Sailer and U.D. Jentschura, Renormalization-group analysis of the layered sine-Gordon type models, hep-th/0509100, Nucl. Phys. B 725 [FS](2005) 467-492

9. S. Nagy, J. Polonyi, K. Sailer, Effective Potential for the Massive sine-Gordon Model, J. Phys. A: Math. Gen. -A/213793/SPE/142507

10. S. Nagy, I. Nándori, J. Polonyi, K. Sailer, Renormalizable parameters of the sine-Gordon model, hep-th/0611061, Phys. Lett. B 647 (2007) 152-158

Selected publications (1977-2002):

1. K. Sailer, S. Daróczy, P. Raics, S. Nagy, $(n, 2n)$, (n, p), and (n, α) cross sections for Cr and Zr isotopes at 14.8 MeV neutron energy,*Materialy 4-oi Vsesoyuznoi konferencii po neitronnoi fizike,* Kiev, 1977, (Moskva, 1977) II/246. (in Russian)
2. A.D. Foursat, E. Lyovshin, K. Sailer, On the structure of the transition matrix element in high-energy nuclear reactions, Nucl.Phys. **392** (1983) 399.
3. K. Sailer, W. Greiner, I. Lovas, Phase transitions in quark-gluon matter, Phys.Rev. **C34** (1986) 925.
4. K. Sailer, B. Müller, W. Greiner, Hadronic Matter in the String Model, In *Quark Gluon Plasma*, ed. by R. C. Hwa, (World Sci., Singapore, 1990) 299.
5. K. Sailer, Th. Schönfeld, A Schäfer, B. Müller, W. Greiner, Transverse Size Effects in the Fragmentation of Hadronic Strings, Phys. Lett. **B240** (1990) 381.
6. I. Nándori, J. Polonyi, K. Sailer, On the renormalization of periodic potentials, hep-th/9910167; Phys.Rev. **D63** (2001) 045022.
7. J. Polonyi, K. Sailer, Renormalization of composite operators, hep-th/0011083; Phys. Rev. **D63** (2001) 105006 (19 pages)