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# Gerhard Kahl

## CURRICULUM VITAE

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### Name

Gerhard Kahl

### Personal Information

born on January 7<sup>th</sup> 1957 in Wien (Austria)

married to Andrea Kahl; one child: Benedikt M. Kahl

### Present Position

Associate Professor

Institut für Theoretische Physik and

Center for Computational Materials Science (CMS)

Technische Universität Wien

Wiedner Hauptstraße 8-10, A-1040 Wien, Austria

### Education & Studies

- Highschool (1967 - 1975)
- Technical Physics, Technische Universität Wien (1975 - 1979)
- PhD in Technical Sciences (Dr. techn.), Technische Universität Wien (1980 - 1983)
- Thesis: "On the Structure of Simple Liquids" (supervisor: J. Hafner)
- Formation for highschool teacher in mathematics and physics (1981 - 1985)
- Habilitation "Condensed Matter Theory", Technische Universität Wien, 1988

### Academic Positions

- assistant (1980 - 1986): Institut für Theoretische Physik, Technische Universität Wien
- 'post-doc' (1987, 1988): Laboratoire de Physique Théorique des Liquides (J.-P. Hansen), Université Pierre et Marie Curie, Paris
- assistant professor (since 1988): Institut für Theoretische Physik, Technische Universität Wien
- associate professor (since 1997): Institut für Theoretische Physik, Technische Universität Wien

### Academic Titles

Dipl. Ing. (1979), Dr. techn. (1984), Mag. rer.nat. (1986), Dozent (1988)

### Scholarships & Prizes

- PhD "summa cum laude" (1984)
- "Erich Schmid"-prize of the Österreichische Akademie der Wissenschaften (14.5.1986)
- 2 × "Ludwig-Wittgenstein"-scholarship of the Österreichische Forschungsgemeinschaft for young scientists (1984 - 1986)
- "Erwin Schrödinger"-scholarship of the Austrian Research Fund (FWF) (1986)
- Kardinal-Innitzer Förderungspreis (15.12.1994)

## National Scientific Projects

- FWF (J0156P) "Structure of liquid metals, liquid alloys and metal-salt solutions"
- FWF (M0014-PHY; co-applicant) "A unified description of the liquid and gaseous phases of expanded liquid metals"
- FWF (M0181-PHY; co-applicant) "Collective excitations in expanded liquid metals and insulating fluids"
- FWF (M1170-N16, submitted; co-applicant) "Self-organization scenarios in inverse patchy colloid systems"
- FWF (P7618-TEC) "Structure and thermodynamics of simple liquids and their mixtures"
- FWF (P8912-PHY) "Elementary excitations in liquid metals"
- FWF (P11194-PHY) "Density functional theory for confined fluids"
- FWF (P13062-TPH) "Phase transitions in simple fluids"
- FWF (P14371-TPH) "Structure, thermodynamics, and phase transitions in polydisperse liquid mixtures"
- FWF (P15758-TPH) "Phase behaviour and criticality in simple fluids"
- FWF (P17823-N08) "Phase transitions in soft matter systems"
- FWF (P19890-N16) "Glass formation of colloids confined in porous materials"
- FWF (W004; co-applicant) Science College "Computational Materials Science"
- OENB (3204; co-applicant) "Theorie der Struktur der kondensierten Materie"
- OENB (4649) "Dynamic properties of liquid alkali metals"
- OENB (6241) "Structure and thermodynamics of fluids in porous media"
- Federal Ministry (co-applicant) "Atomic dynamics in liquid and glassy systems"
- Federal Ministry "TIPTOP – eine Informationsstruktur für die Physik"
- Federal Ministry "Structure, thermodynamics and phase behaviour in polydisperse liquid mixtures"
- bilateral projects with France, United Kingdom, Slovenia, Czech Republic

## Participation in European Projects

- Member of the Management Committee of COST Action P13, "Forging the missing link: From Molecular Simulations to Nanoscale Experiments" – MOLSIMUL
- Member of the Management Committee of COST Action D43, "Colloid and Interface Chemistry for Nanotechnology"
- Node-coordinator in the Marie Curie Initial Training Network (ITN) "Physics of Complex Colloids: Equilibrium and Driven" (COMPLOIDS)

## Conference Activities

- Conference Secretary of the conference "Liquid and Amorphous Metals 8" (LAM8), Wien (Austria) August 1st - September 4th 1993
- Member of the Local Organizing Committee of the "Fifth Wigner Symposium", Wien (Austria) August 25th - 27th 1997
- Co-organizer of the CECAM-Workshop "Fluid phase behaviour and critical liquid state theory and simulations" (together with D. Pini and N.B. Wilding), Lyon (France), July 5th - 7th 2007
- Member of the Austrian Advisory Board of the "33rd Conference of the Middle European Cooperation in Statistical Physics – MECO33", Puchberg/Wels (Austria), April 14th - 16th 2008
- Co-organizer of the CECAM-Workshop "New trends in simulating colloids: from models to applications" (together with G. Foffi and R. Vink), Lausanne (Switzerland), July 15th - 18th 2009
- Co-organizer of the "8th Liquid Matter Conference – LMC8", to be held in Wien (Austria), September 6th - 10th 2001

### **Services to the Community**

- Reviewer for the Deutsche Forschungsgemeinschaft (DFG), Slovenian Research Agency (ARRS), Department of Energy (DoE), Austrian Academy of Sciences, Petrol Research Fund
- Referee for Chemical Monthly, Condensed Matter Physics, Europhysics Letters, Journal of Chemical Physics, Journal of Non-crystalline Solids, Journal of Physics A, Journal of Physics (Condensed Matter), JSTAT, Molecular Physics, Physica B, Physical Chemistry Chemical Physics, Physical Review B and E, Physical Review Letters
- Member of the Liquids, soft matter and biological physics board of "The Journal of Physics (Condensed Matter)"  
Guest Editor in "Molecular Physics"

### **Member in Scientific Organizations**

- Member of the Austrian Physical Society (ÖPG)
- Member of the "Center for Computational Materials Science" (CMS)
- Founding member of the Science College "Computational Material Science"
- Austrian Representative at the "Scientia Europæa Conference" (Fondation Rhône-Poulenc de l'Institut de France)
- President of the Austrian Chemical Physical Society (CPG) 2003/2004

### **Research Interests**

During the past years our scientific activities have focused on the investigations of the static, dynamic, and self-assembly properties of soft matter systems, with particular emphasis on colloidal dispersions. Our research is based on a broad variety of statistical mechanics based techniques or concepts, ranging from integral-equation approaches, over classical density functional theory, mode coupling theory, computer simulations, to optimization strategies based on ideas of genetic algorithms.

Typically, our investigations start from a monomer resolved model for colloidal particles (such as dendrimers, polymers, etc.) for which we derive via suitable coarse-graining approaches effective interactions, that also take the surrounding solvent into account. Based on these interparticle potentials we evaluate structural and thermodynamic properties of the system, with particular emphasis on the phase diagram. Special focus is put on characteristic self-assembly scenarios, such as clustering phenomena or the identification of ordered equilibrium structures. Furthermore we study the dynamic properties of colloidal systems, investigating possible dynamical arrest scenarios. Recent efforts have been dedicated to soft systems under confinement, whereby the latter can be realized either via limiting walls or via disordered, quenched particle configurations as they are encountered in porous systems.