Meet Daan Frenkel

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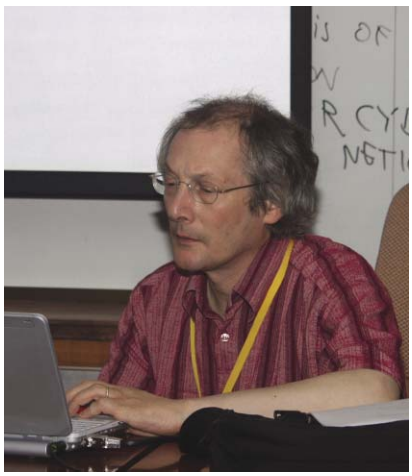
Soft Matter profiles new member of the Editorial Board Daan Frenkel.



Daan Frenkel

Daan Frenkel was born in Amsterdam in 1948. He received his university education in that town and did his PhD research in Physical Chemistry in the laboratory that was originally built for Van 't Hoff (the laboratory built for van der Waals was across the street).

His PhD research focused on the experimental study of quantized rotations in liquids but, as part of that research, he spent half a year at CECAM in Orsay, to familiarize himself with classical computer simulation techniques (1975). He has not stopped doing simulations ever since—although the research topics have changed considerably.

After finishing his PhD (1977), he went to work as a postdoctoral fellow at the Department of Chemistry at UCLA where he did numerical studies of collision-induced light scattering and on two-dimensional melting. In 1980, he joined Shell Research in Amsterdam where he worked for a year and a half as a research physicist. He then moved to the department of Physics of Utrecht University where, as a junior staff member, he started extensive numerical studies of colloidal liquid crystals. In 1987, he moved the FOM Institute for Atomic and Molecular Physics, where he became group leader of the new "Computational Physics" group. In the same year, he was appointed part-time professor at the Department of Chemistry of Utrecht University. In 1998 he was appointed part-time professor of computational macromolecular chemistry at the University of Amsterdam and he became scientific director of the Amsterdam Centre for Computational Science. In the same year, he was elected member of the Royal Dutch Academy of Sciences. In 2005 he was appointed honorary professor at Beijing University of Chemical Technology.

Personal statement

Before I started my university studies, I was not at all sure whether I wanted to do biochemistry or chemistry or physics. However, during the holidays before my first year at the university, I read part I of the Feynman lectures on Physics, and it changed the way I looked at all sciences. During my university training, I was never taught anything about liquid crystals, polymers or colloids (writing these words, I still find it hard to believe). So I knew nothing about soft matter. This changed when I worked at UCLA, where soft-matter physics was definitely a hot topic. However, my own research on soft-matter physics started with my studies of liquid crystals—more precisely, after reading De Gennes' book on liquid crystals. From the early 1980's on, I was also much inspired by many discussions with my colleague Henk Lekkerkerker, initially in Brussels but, from 1985 on, in Utrecht.

One of the areas in soft-matter physics that has intrigued me for many years is the study of entropic phase transitions. Transitions where the increase in visible order is accompanied by an increase in entropy are much more prevalent than I would ever have expected. The study of these transitions has brought me in contact with many areas of soft-matter physics (and even some quantum physics). During the past decade, I invested much effort in the development of techniques to study the early stages of crystal nucleation—in particular in colloidal systems. This is a subject where experiment, theory and simulation continue to stimulate each other—it is a field full of excitement and of controversy.

Simulation of soft matter is never a goal in itself: the aim is to understand how relatively simple building blocks (rods, spheres, plates, coils) can give rise to highly complex collective behavior. The most extreme example of such behaviour can be found in living organisms. And this is the area where, both in the short and the longer term, the simulation techniques of soft-matter physics can be applied—and be enriched in the process. Fortunately, this problem area is so large and diverse that I only see it as a road, not as a destination. I hope that I can convince others that this road is, indeed, a scenic route.

Not surprisingly, I like my work. In particular, I enjoy contact with students, postdocs and colleagues—both in my own institution and elsewhere on this planet. I learn from them. Of course, I always wish I had more time to spend with friends, colleagues and family. Yet I cannot complain about administrative duties because most of the duties that I have are "self-inflicted".

I do not try to follow the example of great scientists, because some of the greatest scientists were not necessarily so great as a person. However, there are certain scientists whom I admire because of the incredible boldness of their ideas. There are a few of those in history (there are probably more, but we do not know all of them). Newton, Einstein, Maxwell, Galilei: they are all giants. However, none of them has shaped our scientific culture to the extent that Euclid has. He created the framework, the rules within which science could develop to become a discipline where "yes" can be distinguished from "no".

After having expressed my love for soft-matter physics and its logical

partner bio-physics, it may come as a surprise that there is another scientific problem that would be number one on my "to do" list—that is, if I could solve it. It is the solution of the sign problem for many-fermion systems. Why this problem? Precisely because, unlike the sprawling field of soft and bio physics, it is a well-defined problem. It is, indeed, the kind of problem that, if it can be solved, can be achieved by one person within one life span. However, serious suggestions have been made that it cannot solved. That is why I prefer the rich variety and the infinite possibilities of soft matter physics.

We are all Soft Matter. That will certainly be an important factor in determining the future of the field. I hope that the journal *Soft Matter* can become a forum for discussion of areas at the boundaries of soft-matter physics. This requires a very open-minded approach. It is my impression that the new journal could offer a platform for discussion of truly new developments. I am a bit hesitant to use the word interdisciplinary—not because I am opposed to it; quite on the contrary. However, it requires a good knowledge of mono-disciplinary fields to make a useful contribution to multi-disciplinary research. In this sense, *Soft Matter* should be a meeting place—not a melting pot.