

**Mass Spectrometry of Large Non-Volatile Molecules
for Marine Organic Chemistry**

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Mass Spectrometry of Large Non-Volatile Molecules for Marine Organic Chemistry

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**MASS SPECTROMETRY OF LARGE NON-VOLATILE MOLECULES
FOR MARINE ORGANIC CHEMISTRY**

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*This volume is dedicated to the next generation,
represented at the Workshop by Caitlin Erin Macfarlane,
1. February 1990.

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Welcome
by the President of the University of Oldenburg

Ladies and gentlemen, dear colleagues!

It is a great pleasure for me to welcome you at the University of Oldenburg. I'm doing so on behalf of the President of the University, Prof. Dr. Michael Daxner, who asked me to offer you his greetings and best wishes.

As you know the interdisciplinary research in marine sciences is strongly supported by the University as a whole. This research is especially the task of our new Institute for Marine Research (ICBM) and plays an important role in the work of our Physics Department. We are proud to act as hosts at your workshop on the Physics of Small Systems for the third time.

From Eberhard Hilf I learned that your subject this year is the development and application of one of the most promising methods of microphysical marine research. In this context I'd like to stress just one point. In the minds of politicians and even the general public there are great expectations that marine research will help to overcome the vast problems which are generated by the pollution of the North Sea. But it is quite clear that new knowledge alone cannot master the mistakes of the past. By far the most important function of new findings is — in my opinion — to show us what we do not know yet. The more we learn of the functioning and processes of the ecosystem the more we should be aware that we still have grasped only small pieces of the whole. In considering our lack of knowledge and understanding we are taught to handle the environment with care.

Hoping that your work will contribute to such conscious application of scientific knowledge I wish you a very fruitful and successful meeting.

Thank you very much

Ulrich Kattmann
(Vicepresident)

Welcome by the Nordseebad Spiekeroog

You are warmly welcomed to our holiday island Spiekeroog, the green oasis in the centre of the national park *Niedersächsisches Wattenmeer*. Spiekeroog has an ample stock of trees which is unusual for a North sea island as well as an absolute prohibition of motor vehicles. Therefore, it is called *Green Island of Calm and Silence*.

The Kurverwaltung and local administration agree with the 672 inhabitants and the regular guests returning year after year that the character of the island should be preserved as far as possible. Hypermodern means of transport such as Hover crafts are therefore as strongly refused as the construction of an airport (which existed in former times!). The modernization of existing tourist centres is supported by all means. The construction of verandas and transom windows which are typical of the island is subsidized in the scope of the restoration of the village.

Spiekeroog offers 4,500 guest beds at all categories and receives 56,000 visitors with 563,000 overnight stays a year. At present, no further increase in guest beds is planned in order to assure a relatively large area of nature and free space per guest and to further guarantee an ecologically consistent tourist trade as a smooth alternative.

A lot of family businesses invite you to rest and regenerate. For those of you who look for discussions in small groups, the following restaurants are recommended:

Café Gerdes,
Altes Inselhaus,
Spiekerooger Teestube,
Hotel Café Landmann,
Bistro Bahnhof.

A rich menu for lunch and dinner is offered by:

Hotel Inselfriede,
Hotel Landmann,
Hotel zur Linde,
Hotel Upstalsboom,
Hallenbad-Restaurant Wattwurm,
Strandhalle,
Restaurant Loogschänke.

Hoping that we could give you a general survey of our green holiday island we wish you a lot of successful days which are full of experiences but also relaxing without the stress of everyday life. We are sure that the atmosphere of Spiekeroog will have a stimulating effect on the conference and wish you a lively exchange of experiences with your colleagues.

Angelika Berger
(Kurdirektorin)

Preface

Four years ago we were asked by W. Krumbein, a geomicrobiologist in Oldenburg, who is engaged in marine research, what Nuclear Physics could do for producing further progress in marine sciences, especially for solving some of the rigid problems in the area of chemical analysis. Our spontaneous answer was *PDMS*, just this particular desorption process which we were simulating in our theoretical calculations.

Indeed, the gentle desorption of even large and fragile organic molecules by means of sudden energy excess induced by the impact of a primary heavy ion, moving just with the velocity of the atomic electrons, appeared promising to observe hopefully directly the chemical composition of a given mixture of organic molecules by just gathering all the molecular ion peaks. Our large optimism was due to the fact that we did not know much about the many problems of sample preparation, of quantitative analysis, of ionization competition, etc.

The ecological situation in marine systems, like sediments, is mainly measured by either ardously observing the bacteria and algae or by analyzing its anorganic chemical composition. Vast worldwide experience has been accumulated in this area. Also the small organic molecules are sometimes as well included in these investigations. To use the observed chemical composition as a fingerprint for the ecological situation failed to a large extent. Additionally, the anorganic and light organic components are on a certain scale apparently more resistant than the biological system itself.

Now recently it was found that probably the organic content stored in form of heavy unidentified molecules in seawater or marine sediment, is much larger than assumed so far. Thus the idea came up to use the larger organic molecules which often are more fragile but also more sensitive to their ecological surrounding, as a reproducible fingerprint for the biological system.

It is due to the experts of *PDMS*, who were willing to devote their interest to these ideas, and attended this workshop, that on one hand we got discouraged many times by the complexity of the task, to tame and to adjust the *PDMS* to this aim, but that we got hope by many hints and proposals that eventually all these difficulties might be overcome. Thus it was the engagement of the participants to make this meeting fruitful.

We think that the many examples of fruitful applications to marine samples, in the contributions to this volume point out the largely unrevealed power of the methods. It will give the reward also to those who hope that Nuclear Physics and Spectroscopy, as Physics in general, will help to mark and point out possible improvements for the ecological situation.

To get the meeting scientifically into shape the continuous advice and encouragement by *Catherine McNeal*, *Yvon Le Beyec*, *Peter Roepstorff*, *Karl Wien* and *Hartmut Jungclas* was of great help.

The Workshop was supported by the German Bundesministerium für Forschung und Technologie, and by the State of Niedersachsen through its Ministerium für Wissenschaft und Kunst, with some addition by the University of Oldenburg, while the Fachbereich Physik served with its infrastructure. From Industry we acknowledge some subsidiary support of the companies *SEUS* from the close by town of Wilhelmshaven, *FINNIGAN MAT*, *AGFA-GEVAERT* and some minor contributions by *F.U.G.*, *PINK*, *BALZERS*.

We acknowledge the local preparation and organization of the workshop by the conference secretaries, *Irmgard von Stuckrad* locally assisted by *Juliane Hilf*. Both did an impeccable work and still maintained to cheer up whoever stepped into difficulties in the process of organization. The professional never ceasing and continuous management and unselfish help of *Thilo Seyfarth* is praised here as well.

The manuscripts mainly came in by data files set up by various text processing systems. It was *Wolfgang Schlez*, virtually alone, who put them into shape by \LaTeX and who did the immense layout work. It helped a lot that he is a bright physics student. His meticulous, impeccable, sturdy, patient, thoroughly engaged work should be honoured by the pleasure of the reader's eye and should funnel all his concentration on the content.

The printing was done on an AGFA-P400 Printer-Station.

We thank the participants for plunging into the field of applying Desorption Mass Spectrometry to Marine Organic Chemistry and hope that you will enjoy reading this volume.

Oldenburg, 1. April 1990

E. R. Hilf, W. Tuszynski

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