Brochure „Neutrons for industry and medicine“

Preface
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Research reactor “made in Germany”

The cradle of German neutron research is to be found in Garching. The original research reactor built in 1956/1957 was the first atomic facility on German soil. Back in those days only 17 months elapsed between the decision to construct the reactor and the assumption of operation. The heart of the old reactor was “made in America”. Today we are building a research reactor “made in Germany”. This is something we can be proud of and yet we must also look to the future.

The number of external groups not just from our own faculty, not just in Germany, but also in other parts of Europe, who wish to contribute their expertise to help bring this reactor to the most modern range of application is steadily increasing. Modern instruments and experiments are already today being constructed and thought up so as to be in a position to make state-of-the-art use of the first neutrons produced by FRM-II in the year 2001.

Science as practised at university level must not see itself solely in terms of ivory-tower research. Although universities must create Nobel Prize knowledge, it is also necessary that we educate young people to translate this knowledge in as short a period of time as possible into successful procedures, methods, products and services.

In order to achieve this we must also foster the kind of translation talents that are required to mould this Nobel Prize knowledge into economically usable forms.

The opening up of the universities is reflected in the new university legislation passed in the summer of 1998 by the Bavarian Landtag. This is important because, for the first time ever, elements of competition have been anchored in legislation of this nature. In the future, more than has been the case in the past, those who are more efficient in scientific research and development, and in the teaching and training of young people, the three tasks of the university, will be rewarded for their efforts. And those who are not so efficient will have to be encouraged to do better. The Technische Universität München advocates in particular a University Council which also will bring with it more farsightedness from without. It is not that the university itself is not far-seeing, it is just that the kind of far-sighted attitudes that come from outside are different, comprising other horizons than those which the university, given its own picture of itself, can contribute.

The Technische Universität München is also in the process of specifying its structural policy, of establishing new fields of teaching and research, largely in conjunction with industry. Medical technology - particularly from the material and engineering points of view - will be one of our subjects.

The boost being given to the “Life Sciences Center” in Weihenstephan will also take place in close interaction with industry. Well-known companies from both at home and abroad have committed themselves to participating in the development of this new “Life Sciences Center”, and not just through providing good ideas. Here, too, we will be placing our hopes in interface efficiency in our development policy. For this is what will increasingly matter in the future. Natural scientists must not work isolated from the engineers and they, in their turn, should not develop in isolation from medical experts, nutritional scientists and sports scientists. Links must be created between these different fields.

But to return to the research reactor Munich-II. The symposium and the publication at hand are intended to show how, by employing neutrons, the often “better X-rays”, advantages can be achieved in analysis and testing techniques.

One topic treated is high-performance analysis in the best sense of the word. Information is provided on the use of neutrons in investigating the modern nanometre structures which are becoming increasingly important in materials research and utilisation - a classical inter-disciplinary and yet very up-to-date field. Another subject that is looked into is the production of reactor-based isotopes which can be used both in connection with activated components to measure wear or as radioisotopes with differing half-life qualities in medical diagnosis and therapy. And finally weld seam testing using neutrons is also a subject of examination.

A lot of research still has to be done in connection with many chemical elements. Rhenium is a particularly good example here. Rhenium-186 can, owing to its nuclear-chemical properties, be used in the palliative treatment of bone metastases. From the chemical side, however, not enough progress has been made to hold out the concrete prospect of medical application.

Against this background it is clear just how important it is that in Garching, in connection with the research neutron source, sufficient space is created for interested industrial partners, for those starting up businesses, and for already existing national and international enterprises that wish, in a figurative sense, to “purchase” neutrons and apply them to suit their purposes.

It is not possible to “send” neutrons “by post”. For this reason it is necessary that adequate working and application-orientated facilities are created in the immediate vicinity of the source. Here, it must be possible to produce radiopharmaceuticals, to carry out silicon doping for semiconductors, and to investigate different possibilities of weld seam testing and high-performance analysis, just to list a few of the areas which come into question. The radiopharmaceuticals market alone can point to a world-wide turnover of well over a thousand million U.S. dollars at present, of which virtually nothing is produced in Germany.

In order, amongst other things, to meet such requirements in relation to the economic use of neutrons, TUMTECH GmbH was set up at the end of July 1998. This company, run by the Technische Universität München, will in general attempt to put to use in a competitive context the scientific competence of the university, including, of course, the activities of the new research reactor.