



### A tribute to István Kovács

Looked upon in retrospect any branch of science or any collective human work appears to be an almost independently existing achievement. One great advantage of living in an era of active science, as a contemporary, is to realize that although the results of science are indeed impersonal, perhaps platonically existing entities, the way to attain them is personal. One great joy in science comes from meeting outstanding, successful scientists. I believe both the Hungarian and the international spectroscopic community would agree that Professor Kovács embodies spectroscopy in an exuberant and pleasant manner.

It is my honour to express this sentiment towards him. The purpose of this introduction to the many original contributions in this special, international, birthday volume is to congratulate Professor Kovács on his becoming an octogenarian, and to cast a glimpse at his life's work.

Spectroscopy is a respectably mature science, born in the middle of the nineteenth century with the work of Bunsen and Kirchhoff. The original need of spectroscopy arose mainly and characteristically from astronomy. The phenomenal developments and blossoming into a true molecular science were made possible by the evolution of quantum mechanics. Spectroscopy is a rigorous physical science and its exactness is particularly evident in the atomic and diatomic realms.

Because the resolvable rotational structure of diatomic spectra was clearly visible according to even the classical techniques of the first half of this century, the study of the quantum-mechanical background of this rotational structure was felt compelling by many authors, among them István Kovács. In diatomic spectroscopy a profound understanding of the interactions of angular momenta in molecules was obtained. These interactions decide the various coupling schemes and the possible spectral perturbations observed abundantly in experimental spectra.

Professor Kovács's main interest, one focus of his life's work has been the description, analysis and interpretation of diatomic spectral perturbations. His work in this subfield has become seminaly important, shown by numerous scientific citations.

Spectral perturbations (first systematically classified by him) are manifest not only in the line positions corresponding to various quantum transitions but also in the probability of these transitions, according to the intensities of rotational lines in vibronic bands. István Kovács's very significant contribution to molecular spectroscopy is the systematic elaboration of formulae of line intensities. In diatomic cases it is generally feasible to give closed, analytic expressions for intensities for any coupling scheme, and this is just what he has accomplished.

His particular interest turned to spin-orbit, spin-spin and spin-rotational interactions, and multiplet splitting therefrom for multiplets up to septets. He has also given general formulae for  $\Lambda$  doubling, and especially in his later works, for the corrections of existing formulae arising from centrifugal distortion. His formulae, originally derived by hand, have basically withstood rigorous computer tests that in many cases he himself instigated.

Together with the classical works of Gerhard Herzberg, these results constitute an important basis of much contemporary development in the diatomic field. This is at present an active branch of molecular spectroscopy, due to the extreme resolution and versatility of modern laser-spectroscopic methods. Diatomic spectroscopy is widely applied on a grand scale extending from extragalactic astrophysics to the dynamics of gaseous reactions in the laboratory. Understanding molecular structure in the broadest sense would clearly have been impossible without the diatomic foundation.

Almost thirty years ago I acted as translator of István Kovács's book: *Rotational Structure in the Spectra of Diatomic Molecules* into the English language. Appearing in 1969 the book generated two editions and was rapidly sold out. It has become a widely used textbook for the diatomic spectroscopic community. Professor Kovács has, however, not stopped simplifying and extending the results described in his book, and has published many papers since 1969.

His theoretical activity, evolving over half a century, has gained and enhanced respect and appreciation abroad for Hungarian physical science and constitutes a natural continuation of previous significant work in quantum mechanics and spectroscopy by, e.g., János Neumann and Jenő Wigner. His work has established an "invisible college" internationally in diatomic spectroscopy. His achievements as a scientist have been recognized by his home country in the awarding of the prestigious Kossuth Prize in 1951 jointly to him and Professor Ágoston Budó, and by his promotion to full member of the Hungarian Academy of Sciences in 1967. Other nominations to important international and Hungarian scientific bodies ensued. In 1975 he was awarded the Hungarian State Prize.

Pursuing science in Hungary in the turbulent historical period from 1936 to the present could not have been, and was not, in fact, either simple or easy. Remaining faithful to his science and to his country, even in periods difficult for individual research, the creation and management of the first large-scale institute

of physical research in Hungary between 1950 and 1956, and, most of all, remaining productive throughout so many decades is remarkable indeed. It demonstrates love and devotion to his science, spectroscopy, and special traits of character that keep his spirits fresh and innovative. Meeting him on various occasions I was always impressed by his personal energy, and I experienced inspiration radiating from him. I should like to state here my appreciation of, gratitude to and affection for him for providing a convincing example to us, Hungarian spectroscopists, and to his many followers abroad how to live a scientifically fruitful life. Perhaps I should mention here Professor Kovács's broad cultural involvement, his active enjoyment of music and literature, as well as his keen interest in the entire range of the physical sciences.

Among his diverse activities, István Kovács has been chief editor of *Acta Physica Hungarica* from 1971 until this year, a national journal that has made great efforts to remain competitive among the many excellent journals of physics in the world.

Let us wish Professor Kovács much happiness for his eightieth birthday and good health for many years to come. Please, István, teach us more and keep showing us the way.

*László Nemes*