

## Akito Arima and Nuclear Data

(Personal recollections of the forgotten Arima Panel story)

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### 1. Mr. Science of Japan

Prof. Akito Arima (1930-2020) left deep imprint on nuclear structure physics research, a fact well known and widely appreciated. Virtually unknown is his lasting impact on nuclear data research. In 1995, Arima chaired a high-ranking international panel at the IAEA headquarters in Vienna which influenced nuclear data funding worldwide for many years to come. Below are my personal recollections of this unique event, nearly forgotten story about Arima Panel, reminding our community how much we owe this exceptional man.

Akito Arima is known for many achievements: father of the interacting boson model which remarkably captured intricacies of collective states of deformed nuclei; president of the University of Tokyo; director of RIKEN; member of the Japanese Diet; minister of education and science of Japan. “Mr. Science of Japan”, such was an eloquent description of Arima by R.A. (Dick) Meyer, an accomplished radiochemist, DoE manager of the US Nuclear Data Program and chair of the IAEA International Nuclear Data Committee in one person.

### 2. Nuclear Data in Crisis

Nuclear data is the term coined around 1960 for collection, evaluation and dissemination of nuclear physics constants describing low energy nuclear reactions and nuclear structure. Users were primarily nuclear power reactor engineers and nuclear structure physicists, with a number of smaller user groups covering growing range of nuclear applications.

International nuclear data networks were established, the IAEA Nuclear Data Section (NDS) playing an indispensable coordination role and serving as vitally important East-West conduit in the then bitterly divided world.

A memorable year 1989 and early 1990-es brought major global shock-waves. The Iron Curtain felt down along with the collapse of once mighty Soviet Union empire and all its East European satellites. Unimaginable happened: the Cold War was over! These were monumental events with huge consequences. My own country, Czechoslovakia, eagerly started painful journey back to its rich history of democracy, but later split into Czechia and Slovakia. Support for nuclear physics and technology in two nuclear superpowers was suddenly questioned. Compounded with the 1986 Chernobyl disaster, nuclear physics spiraled into global disfavor. Post-Chernobyl syndrome was in full swing, the word “nuclear” itself was an object of public fear. As an example, a powerful medical diagnostic method NMR, based on the nuclear magnetic resonance effect, dropped the word “nuclear” and became MR to accommodate frightened patients.

Inevitably also nuclear data programs started to feel the heat. The US nuclear data program got early warning via non-negligible budget cut, the USSR program was sinking into disarray and question marks surrounding the IAEA program kept growing.

### Historical photo: NRDC meeting in BNL, 1987

*Joe Schmidt, Charlie Dunford, Vicki McLane, Hans Lemmel*

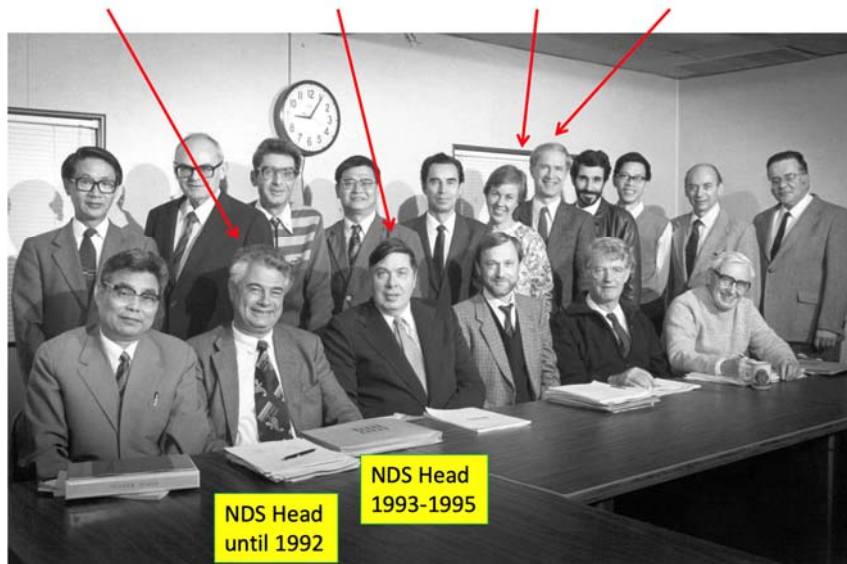


Fig. 1 Joe Schmidt and Charlie Dunford in the 1987 NRDC meeting. Neutron cross section data exchange between USA and USSR, initiated in 1964 and broadened into Nuclear Reaction Data Center network, was remarkable achievement.

To make things worse, the IAEA Nuclear Data Section was troubled by extended vacancies in its two top positions. Early 1992, the NDS founding father Joe Schmidt retired after serving 22 years as its head. His deputy, somewhat withdrawn Doug Muir, completed the term and returned to LANL shortly afterwards. A new NDS head ought to be ambitious Dieter Seeliger of TU Dresden, East Germany, but he did not make it. The government of the unified Germany got a word about shadow activities in this Technical University and blocked his nomination in the last minute. In this situation Charlie Dunford, seasoned head of the US National Nuclear Data Center at BNL, agreed to take leave of absence and fill-in the troubled vacancy for two years starting July 1993.

I joined the IAEA on 1 June 1993, but it was not easy either. A seemingly simple move from Bratislava, Slovakia to Vienna used for centuries, an hour drive and almost literally just a jump over the Danube, was a cultural shock. The Iron Curtain was gone, but its remnants were everywhere, dull and grey Bratislava was in striking contrast with colorful and lively Vienna. My governmental endorsement has been delayed, Slovakia was a new country which had to apply for the IAEA membership in the first place. Half a year later the matter was resolved, effective 1 January 1994 I was named officially the NDS deputy head. This was prestigious P5 professional position with impressive remuneration, large 5-window office and diplomatic privileges. Future looked great to me.

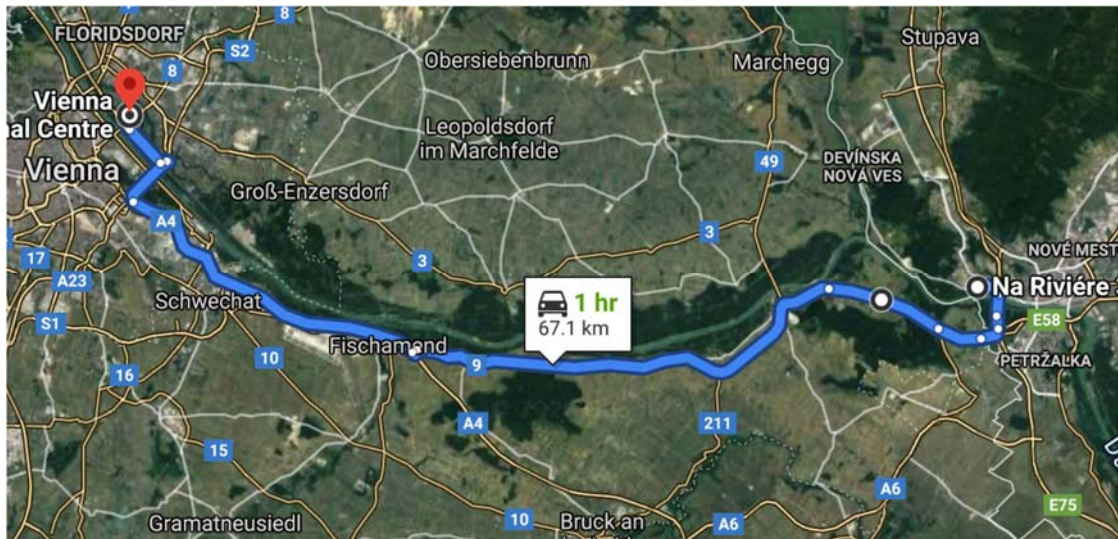


Fig. 2 It took one hour to get from my place Na Riviére, Bratislava, Slovakia to the IAEA. The route along the river Danube was hermetically sealed in 1949 and did not open until 1990. Map data (c) 2021 Google.

Charlie Dunford steered the NDS with the firm hand, but words were leaking that the IAEA Nuclear Data Program, internally known as G1, is loosing support of several influential member states. The powerful office of the Director General, headed by a strongly opinionated John Tilemann of Australia, was pushing for a much feared Peer Review. G1 was deemed to be a relatively easy target, arguably the most scientific program in the IAEA, fairly small (about 1% of both staff and cost) but orthogonal to this large bureaucratic machine. Relocating funds from nuclear data research to other activities looked for many a timely, if not already a long time overdue, move to appease critical voices.

On 7 July 1995, Charlie was returning home and I was taking over as the NDS acting head. I felt uneasy. Charlie sensed that and consoled me: Pavel, there is nothing to worry about, in the summer the IAEA goes into a sleepy mode, in September it will be consumed by the General Conference held annually, in October a new budget will be approved and everything will be just fine.

Until then, I went through two dramatic events in my life. In August 1968, I witnessed foreign military invasion to Czechoslovakia and brutal occupation of Bratislava by Soviet tanks. At the end of 1989, I took part in the Velvet revolution, participated in daily massive protests, addressed a crowd of 100 000 people and watched the fall of socialism. Now, in 1995, I was destined to play a central role in the third event, however unnoticeable for a vast majority of people but on the personal level loaded with a similar, if not a bigger, drama.

Shortly after Charlie left I was summoned to the office of Mr. R.M. Iyer of India, director of the Division of Physical and Chemical Sciences. Not a great fan of nuclear data, a man with maharaja manners, he enjoyed the moment. His message was short and dreadful: there will be in-depth peer review, a high-ranking panel will meet still this summer. The panel should assess G1 program and determine very future of the IAEA Nuclear Data Section. I was fully aware that whatever happens to NDS will propagate around the globe. Nuclear data world was fairly small and closely coupled, everybody was watching everybody else. If we would fail, other groups would follow the suit. A pretty devastating perspective. Responsibility for the whole nuclear data world has fallen on my shoulders.

### **3. Arima Panel**

With a startling speed the IAEA put together a panel of 5 high-ranking nuclear scientists and managers from Japan (A. Arima - RIKEN, president), USA (M.N. Haas - Las Vegas, consultant), Russia (A.V. Zrodnikov - IPPE Obninsk, deputy director), China (Qian Gao-Yun - CNNC Beijing, president) and Germany (G. Kessler - FZ Karlsruhe, director). Prof. Arima agreed to serve as the chair, hence the nickname "Arima Panel". Thanks to our lobbying

effort the panel was later extended by chairs of two standing IAEA advisory bodies, on nuclear data (R.A. Meyer, DoE Washington) and on atomic & molecular data (R.H. McKnight, also DoE). On top of it, Charlie was given a sort of observatory status. The meeting was scheduled from 30 August through 1 September 1995. Showdown was ready to start.

I mobilized all resources at my disposal, took invaluable advice from numerous colleagues around the world, worked closely with the most experienced NDS staff Hans Lemmel, and consulted frequently Charlie Dunford at BNL who kept an open line to Dick Meyer in the US Department of Energy. The following strategy was pursued:

- Bring Charlie and Dick to the Panel meeting in the highest capacity possible.
- Communicate our part of the story to each member of the Panel via a trusted colleague.
- Make a case to the Panel about importance of the Nuclear Data Program for the IAEA Member States.



Fig. 3 With Dick Meyer (right) and our wives in Cape Cod, Massachusetts in 2002. Dick retired to Cape Cod, not far from his home town Boston and close to the bucolic Martha Vineyard island known as the Kennedy-family clan seat and celebrities' vacation resort.

It was tough and exhaustive, but it worked. Variety of approaches and connections were used. Arima was known to keep his director door in RIKEN open allowing any physicist to see him easily. I called Alberto Mengoni, an Italian friend and frequent visitor to RIKEN and

explained the trouble. He listened carefully and said, “No problem, let me cross the corridor and talk to Arima.” Alberto reported mission accomplished the next day. Our mood went up. We were also fortunate that Dick Meyer, reputed scholar with roots in Livermore and 100 Phys. Rev. C papers on nuclear spectroscopy, was well known to Arima. Deputy director Zrodnikov of IPPE Obninsk was thoroughly briefed by Anatoly Ignatyuk. Anatoly, known for his exceptionally deep grasp of physics, was a good friend of mine since 1973 when I engineered his first trip ever outside the USSR. In short, our preparations were systematic and thorough, experience from nuclear data evaluation paid off handily, nothing remained unchecked and nothing was left to chance.

My impression from Akito Arima was of a decent, modest scientist, with a powerful mind and deep appreciation for physics. One could talk to him without hesitation, he would listen carefully and grasp the issue instantly. The panelists were high-ranking men, but no one was a match to Arima, it was he who would shape an outcome of the meeting.

I was puzzled by seeing the Japanese hierarchical system in action. Akito Arima was positioned well above all Japanese officials in Vienna and was treated accordingly, starting with red carpet welcome in the Vienna airport by the Japanese Embassy. Sueo Machi, somewhat indecisive yet powerful IAEA Deputy Director General and the highest representative of Japan to the IAEA, offered his magnificent 12-window office to Arima for preparations. To our delight and to Mr. Machi dismay, Arima without any hesitation asked Mr. Machi to leave the office so that he can held private discussion with Dick Meyer.

The meeting went on for almost three full days, I made three presentations and felt pretty exhausted. At one moment Arima wanted that Panel hears from Charlie Dunford in an unrestrained environment. He asked the IAEA higher-ups observing the meeting to leave them alone, an unexpected demand causing some grudging. Rumors were leaking from the meeting room, but nothing was definitive and tensions were high. Finally, the panel retired to a closed session. After a long while, beaming Dick Meyer opened the door and handed me one-page summary: “Pavel, you made it, my congratulations”. I was excited and browsed through the summary which not only expressed recognition to the IAEA Nuclear Data Section but recommended budget increase:

*“We find that the NDS provides a unique international resource which can only be done within the IAEA. The NDS has a demonstrated record of open and free access to the profile of UN member states and continues to provide a vehicle for bridging single nation concerns...This has been accomplished with an excellent balance in the personnel profile of the NDS ... It is extremely important to recognize that none of the member states could*

*replicate the NDS' capabilities... We are led to having serious concern about resources made available to the NDS. We recommend that immediate action of redirecting funds be taken in order to redress past actions..."*

I cannot put together words describing properly my relief. The NDS was rescued, the IAEA nuclear data program was rescued, nuclear data program worldwide was given a powerful impulse. We got the blessing from the highest authority, from Akito Arima in person. We were lucky that this far-sighted man appreciated fundamental importance of supporting nuclear science in the IAEA. NDS strength was lying in a well defined mission, unique value of services, strong international collaboration, quality data based on due application of nuclear physics including evaluation and validation, and, yes, importance of preserving nuclear physics in the IAEA in the long run.

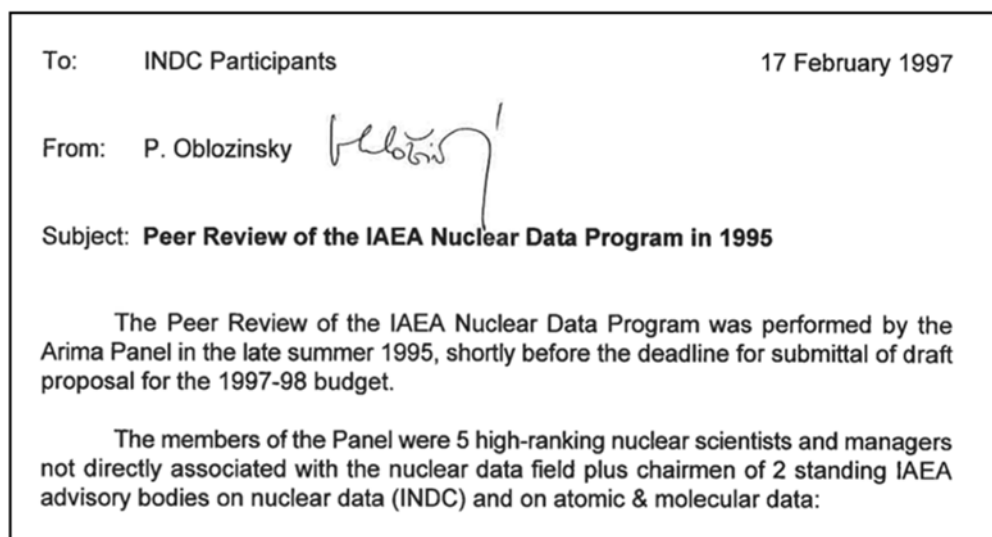


Fig. 4 From the Memorandum INDC/P(97)-1 to participants of the 1997 International Nuclear Data Committee meeting. The Arima Panel performed the only high-ranking in-depth peer review of the IAEA Nuclear Data Program in its entire history.

Full report was delivered shortly after the end of the meeting. Not everybody was happy with the findings and recommendations of the Panel. It was telling that it took three months to officially acknowledge receipt of the report. Draft letter of acknowledgement to Arima had to be rewritten several times, step-by-step reduced to a bare minimum together with downgrading its signatory, to be finally signed - by myself. Yet no one dared to question the



wisdom and authority of Akito Arima openly. More than 25 years later the IAEA Nuclear Data Section is in a remarkably good shape and commands high international respect.

The Arima Panel represents the most dramatic moment in my professional career. And in a way also the most important. I feel blessed that I had a chance to play such an active role in it. On the other hand, I never talked much about the Arima Panel, life went on and there were always more urgent matters requiring full attention. I mentioned the story briefly in two public talks. First, in 2014 in Vienna on the occasion of the 50-year anniversary of the IAEA Nuclear Data Section. Second, in 2018 in Italy on the occasion of the award given to me by the 15th Varenna Conference on Nuclear Reaction Mechanisms. The present paper represents my third and most detailed account, with all likely-hood also the last one. I am grateful to Naohiko Otuka of the IAEA for inspiring me to put this together.

#### **4. Epilog**

In March 2000, I moved from Vienna to Long Island in the New York State, initially serving as the deputy and later as the head of the US National Nuclear Data Center. I reported regularly to the NNDC sponsor, DoE Office of Science, and was repeatedly reminded how important is to have strong IAEA program to justify the NNDC actions and funding.

In 2011, I retired to Bratislava, Slovakia. I am probably the last surviving witness to the Arima Panel and it's almost forgotten 1995 story. Dick Meyer passed away in 2010, Charlie Dunford in 2016 and Akito Arima in 2020. Let me pay my highest respects to each of them. And, if I may, on behalf of the international nuclear data community: thank you!