Reminiscences and Reflections on the History of International Conferences on Spectral Line Shapes

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Abstract. A brief account of the history of International Conferences on Spectral Line Shapes (ICSLS) is given. Although in common use the “Europhysics Study Conference on Spectral Line Broadening and Related Topics” held in Meudon in 1973 is referred to as the first in the current sequence of ICSLS meetings, it is noted that five conferences dealing with line shape topics were organized before 1973 both in the USA and in Europe. Some details are given about their format and program. In particular, “The First International Conference on Spectral Lines” held in 1972 at the University of Tennessee at Knoxville is remembered as a meeting fully devoted to line shape problems, and as such should be regarded, in addition to the Meudon conference, as one of the roots of the line-shape community. Some of the highlights of particular ICSLS conferences as well as characteristics of their proceedings are briefly reviewed.

1. Introduction
I feel very honoured at having been asked to review the history of International Conferences on Spectral Line Shapes (ICSLS), but in truth I am aware that I have been asked because I am now one of the oldest remaining members of the line shape community who still has a recollection of the very beginning of this conference series. In particular, I remember two conferences dealing with line shape topics that I attended in 1968 and 1972, but which seem to be forgotten nowadays as they are not included in the current sequence of line-shape conferences. One of the invited speakers at the 1968 Conference, held in Warsaw, was the late Professor Aleksander Jabłoński, a pioneer of the field of pressure broadening. It was he who in 1946 established the Physics Department of the Nicolaus Copernicus University. So, the year 2016 marks the 70th anniversary of the Jabłoński school of Physics in Toruń. This allows me to dedicate this review to the memory of Aleksander Jabłoński who as early as in 1930’s initiated the line-shape research in Poland.

2. About the First ICSLS
In his talk delivered at the 17th ICSLS in Paris in 2004, Dietrich Voslamber expressed a view that “the first in the current sequence of line-shape conferences was held in 1973 at Henri Van Regemorter’s Laboratory at the Observatory of Paris-Meudon” [1]. The same view was formulated as early as 1980 by Burkhard Wende in his Preface to the Proceedings of the 5th ICSLS [2] and later in all materials related to the next line-shape conferences including the present one, the 23rd, held in 2016 in Toruń. It should be noted, however, that the 1973 Conference was named “Europhysics Study Conference on Spectral Line Broadening and Related Topics” and not Conference on Spectral Line Shapes. It was held in Meudon from the 2nd to the 6th of July 1973, and D. Voslamber was the chairman of the Organizing Committee.

According to Voslamber, the name “International Conference on Spectral Line Shapes” (ICSLS), which is presently still in use, was given after “The Second International Conference on Spectral Lines” which was held from the 26th through the 30th August 1974 at the campus of the University of Oregon in Eugene, Oregon and was chaired by Shang Yi Ch’en. To my knowledge, however, the Eugene Conference was not related directly to the Meudon meeting but rather to “The First
International Conference on Spectral Lines” which took place from August 28 to September 1, 1972 at the University of Tennessee in Knoxville, Tennessee. Its chairman was Harry C. Jacobson. I was privileged to take part at that conference as the postdoc working with William E. Baylis at the University of Windsor in Canada and I remember up to the present day the impression exerted upon me by the lectures by the then most eminent experts in the field of pressure broadening of spectral lines, to mention only Theodore Holstein (Los Angeles), Boris Vodar (High Pressure Laboratory in Bellevue, France), Alan Gallagher (JILA, Boulder), William R. Bennett (Yale University), Arthur L. Schawlow (Stanford), Abraham Ben-Reuven (Weizmann Institute in Rehovot), Charles H. Hooper (University of Florida), Edwin L. Lewis (Newcastle upon Tyne, UK), Walter Lochte-Holtgreven (Kiel), Shang Yi Ch’en (Eugene), Paul R. Berman (New York), Marie-Claude Castex (Bellevue), Antoine Royer (Montreal), François Rostas and Evelyne Roueff (Meudon). I also remember two Roundtable Discussions during the Knoxville Conference; the first one was devoted to Satellite Bands, and the second one dealt with Stark Broadening. W.E. Baylis (Windsor) was the leader of the panel on satellite bands, in which R. Exton (NASA), R. Futrelle (JILA), B. Vodar and R. Granier (Bellevue), K.M. Sando (Un. of Iowa), H. C. Jacobson, A. Royer, and M. Takeo (Portland) took part. In the panel on Stark Broadening headed by C.H. Hooper the following researches participated: W. Cooper (Berkeley), C. Deutsch (Orsay), P. Kepple (Washington, DC), W. Wiese (NBS, Gaithersburg), H. Van Regemorter (Meudon), D. Voslamber (Euratom – CEA, Fontenay-aux-Roses), and W. Jones (Un. of Maryland). It should be noted that although the name “line shapes” was not adopted officially to the Knoxville Conference, it surely deserved such a name since almost 100% of invited and contributed papers dealt with topics on line broadening. All presentations were oral since posters were not in common use at that time. The name “International Conference on Spectral Line Shapes” was officially used for the first time four years later when the 3rd ICSLS was organized by David Burgess during September 13 – 17, 1976 at the Imperial College in London.

3. A Bit of Prehistory
The story about the beginnings of line-shape conferences would not be complete unless we mention meetings organized in the 1950’s in the USA and in the 1960’s in Europe. In particular, the Conference on the Broadening of Spectral Lines was held at the University of Pittsburgh from September 15 to 17, 1955. This conference is still remembered because of the famous paper by P.W. Anderson and J.D. Talman, in which they presented an attempt to span a bridge between the impact and quasi-static theory. Usually it is cited as “unpublished” paper with reference to Bell Teleph. Syst. Tech. Publ. No 3117. Fortunately, the main results of the Anderson-Talman approach were thoroughly discussed in the review article by S.Y. Ch’en and M. Takeo [3] and in the monograph by G. Traving [4].

In 1965 H. G. Kuhn, G. Series and G.K. Woodgate organized the Conference on Atomic Spectra and Radiative Processes which was held from the 12th to the 14th April at the Clarendon Laboratory in Oxford. It was a conference by invitation, international in character and wide in scope. Besides the session on line broadening the subject of the Conference included sessions on isotope shifts and hyperfine structure of spectral lines as well as optical pumping. Hans R. Griem delivered an introductory paper “On the theory of pressure broadening” which was followed by talks by S.Y. Ch’en on pressure effects of foreign gases on the absorption lines of caesium, and by W. Lochte-Holtgreven on the self-broadening of helium lines as well as by J.M. Vaughan on resonance broadening at low pressures. The proceedings of this conference have not been published, but the list of all contributions is collated in a report by Kuhn, Series and Woodgate [5].

After the Oxford Conference two meetings took place in the USA at the Proctor Academy, Andover, New Hampshire in the framework of the Gordon Research Conferences on Spectral Line Shapes, the first one during August 29 – September 2, 1966, and the second one July 8 – 12, 1968. In the same year Tadeusz Skalinski from the Institute of Physics of the Polish Academy of Sciences organized the International Conference on Optical Pumping and Atomic Line Shape which was held from the 25th to the 28th June 1968 at the University of Warsaw. Roughly half of invited and contributed papers dealt with pressure-broadened spectral line shapes. The invited papers were presented by such experts of the field as A. Kastler, B. Cagnac, and A. Omont (all from Paris), S.Y. Ch’en (Eugene), A. Corney, H.G. Kuhn, E.L. Lewis, and D. Stacey from Oxford, J. Fiutak and E.
Czuchaj (Gdańsk), H.R. Griem (Un. of Maryland), W. Happer (Columbia Un. New York), A. Jabłoński (Toruń), G. zu Putlitz (Heidelberg), and R.M. Herman (Penn State Un.).

4. From the 4th to the 19th ICSLS

The 4th ICSLS was held from July 31 to August 4, 1978 at the University of Windsor, Windsor, Ontario in Canada. The chairman of the Program Committee was Wolfgang Wiese (NBS, Gaithersburg) and William E. Baylis (Windsor) was the organizing chairman. The remaining members of the Committee were: D.D. Burgess (Imperial College, UK) acting as the past chairman, D. Voslamber (EURATOM-CEA, Fontenay-aux-Roses) as European Treasurer, G.L. Hammond (White Oak, Maryland) as North American Treasurer, B. Wende (Berlin) as European Coordinator, A. Ben-Reuven (Tel-Aviv) and R.J. Exton (NASA, Hampton, Virginia). As the participant of that conference I remember the amazing inaugural lecture delivered by Derek R. Stacey (Oxford) under the title “Resonance broadening – the truth at last” as well as the invited talk by John (Jinx) Cooper (JILA, Boulder) on “Collisional redistribution of radiation” which was the hot topic in those days.

At the business meeting in Windsor it was confirmed that the next, the 5th, ICSLS would be organized in 1980 in Berlin (West) by Burkhard Wende from the Physikalisch-Technische Bundesanstalt (PTB). This Conference was held in the Reichstag building from the 7th to the 11th of July 1980, but originally it was scheduled to be held in the saucer-shaped Building of the Kongresshalle in the eastern part of the Tiergarten. However, on May 21, 1980 part of the roof of the Kongresshalle collapsed and therefore the Conference was moved to the Reichstag. I attended that Conference and have a recollection of a pleasant atmosphere both during the sessions and the Sightseeing Tour as well as at the Conference dinner and at a warm reception we got from the Senat von Berlin. The Program Committee was almost the same as in the 4th ICSLS except that G.L. Hammond was replaced by C.H. Hooper and H. van Regemorter became the new member. The Panel Session which closed the Conference on July 11 was devoted to summarizing the results of the conference as well as future needs. H.R. Griem was the Chairman of the Panel, the members of which were: W.E. Baylis and D.N. Stacey (Neutrals), D.D. Burgess and J. Seidel (Plasmas), and D. Voslamber (Collisional Redistribution). For the first time in this series of conferences the proceedings of all invited and contributed papers presented in Berlin have been published as a volume (1200 pages) edited by Walter de Gruyter & Co. [2]. At the business meeting it was confirmed that the 6th ICSLS would be organized by Keith Burnett in 1982 at JILA in Boulder, Colorado. At the same meeting I offered, on behalf of the Nicolaus Copernicus University, to organize the 7th ICSLS in Toruń in 1984 and my offer was accepted.

Unfortunately, because of the martial law imposed in Poland at the end of 1981, I was unable to attend the 6th ICSLS, which was held in Boulder during July 12-16, 1982. The proceedings of this Conference were published by Walter de Gruyter as Spectral Line Shapes, Volume 2 [6]. Since the political situation in Poland was still unclear it was confirmed at the business meeting in Boulder that the next meeting, the 7th ICSLS, would be held not in Toruń as previously planned, but in France. François Rostas (Meudon) took on the task of organizing the conference which eventually was held at the CNRS Conference Center of Aussois in the French Alps from the 11th to the 15th of June 1984. It was attended by 175 participants from 13 countries. A new format was tried for the first time in this series of meetings; it consisted of invited lectures in the morning, free time in the early afternoon, posters before dinner and round-table discussions after dinner. Proceedings were published as Spectral Line Shapes - Volume 3 [7]. This time I was present at the conference as well as at the business meeting so that I could personally renew the offer to organize the 9th ICSLS in 1988 in Toruń. At the business meeting Reginald J. Exton (NASA, Langley Research Center) accepted the organization of the 8th ICSLS which was held from the 9th to the 13th of July 1986 at the campus of the College of William and Mary in Williamsburg, Virginia. Proceedings were published as Spectral Line Shapes - Volume 4 by A. Deepack Publishing, Hampton, Virginia [8].

The 9th ICSLS was held at Nicolaus Copernicus University in Toruń during July 25-29, 1988 and was attended by 241 participants from 22 countries and this seems to be the largest attendance in the whole history of this series of line-shape conferences. Following the suggestion by Lothar Frommhold, the Toruń meeting – for the first time in the history of line shape conferences – brought together the communities of pressure broadening and collision-induced phenomena. A special round table discussion “On laser-assisted collisions and collision-induced spectra” was held. Co-chairmen of
this joint discussion were Paul S. Julienne (NBS, Gaithersburg) and L. Frommhold (University of Texas, Austin). The full text of their NOTES and COMMENTS on this round table discussion as well as all invited and some contributed papers are contained in the Proceedings which were published as \textit{Spectral Line Shapes - Volume 5} by Ossolineum Publishing House [9].

The 10th ICSLS was organized by L. Frommhold and John Keto at the campus of the University of Texas in Austin, Texas from June 25 through 29, 1990. I took part in this Conference so that I can agree with the statement of the co-chairmen, Lothar Frommhold and John Keto, who in the Preface to the Proceedings have written: “Unfortunately, the American Southwest was in the midst of a heat wave making it very hot for colleagues from northern climates. Overall, even with this special „warm welcome”, the meeting had its usual enthusiastic sessions and friendly, close discussions”. For the first time the Proceedings were published in the framework of American Institute of Physics (AIP) Conference Proceedings entitled \textit{Spectral Line Shapes – Volume 6} [10].

It was confirmed at the business meeting in Austin that the 11th ICSLS would be hosted by Nikola Konjević, Belgrade, and Goran Pichler, Zagreb in Yugoslavia in the summer of 1992. It is to be regretted that due to the outbreak of the Yugoslav Wars, the International Program Committee had to move the Conference to France. Roland Stamm and Bernard Talin accepted the huge task of organizing the 11th ICSLS which eventually was held in a seaside resort Carry le Rouet, near Marseille from the 8th to the 12th of June 1992. Proceedings under the title \textit{Spectral Line Shapes – Volume 7} were published by Nova Science Publishers, Commack, NY, USA [11]. Two years later, the 12th ICSLS was organized by A. David May in the Physics Department of University of Toronto in Canada during June 13 – 17, 1994. Proceedings entitled \textit{Spectral Line Shapes - Volume 8} were again published in the framework of AIP Conference Proceedings [12].

The 13th ICSLS was organized by Marco Zoppi and Lorenzo Ulivi from Consiglio Nazionale Delle Ricerche in Firenze (Italy) from June 16 through 21, 1996. It was held in the auditorium of Banca Toscana and attended by 160 participants from 21 countries. Besides the traditional sessions devoted to Stark broadening in plasmas, broadening by neutrals, optical collisions in strong laser fields and astrophysical applications a special session was dedicated to a symposium in honor of George Birnbaum. It was inaugurated by Lothar Frommhold who gave a talk entitled “George Birnbaum and the collision-induced Raman and infrared spectroscopies” and which was followed by two invited talks and 12 oral contributions in the field of collision induced spectroscopy. I still have in mind the impressive presentation by L. Frommhold and Wilfried Meyer (Kaiserslautern) on collision-induced emission and sonoluminescence. Proceedings under the title \textit{Spectral Line Shapes - Volume 9} were published as AIP Conference Proceedings [13].

Roger M. Herman from Pennsylvania State University was the host of the 14th ICSLS which was held in State College, Pennsylvania from June 22 to 26, 1998. It was attended by 97 participants from 15 countries. In this Conference special attempt was made to incorporate novel techniques for studying line shapes, as well as a full discussion of line shape phenomena in the ultracold regime. The program of the Conference included a symposium in honor of the 100th anniversary of the birth of Aleksander Jablonski which consisted of three invited and one oral contribution. \textit{Spectral Line Shapes - Volume 10} was the title of the Proceedings published by AIP [14].

The 15th ICSLS was held in Berlin from 10 to 14 July 2000 and was chaired by Joachim Seidel from PTB. All sessions took place in PTB’s Hermann von Helmholtz building, named after the first president of the Physikalisch-Technische Reichsanstalt. It was attended by 121 participants from 24 countries. As in the previous four conferences the Proceedings \textit{Spectral Line Shapes - Volume 11} were published by AIP [15].

In 2002 (during June 3–7) the 16th ICSLS was organized by Christina A. Back from Lawrence Livermore National Laboratory and University of California, Davis and was held in Berkeley, CA at the Clark Kerr Campus of the University of California. Participants represented 14 countries and delivered 68 papers, 61 of which are included in \textit{Spectral Line Shapes - Volume 12} published by AIP [16]. Unfortunately, due to the September 11 attacks some people were unable to get visas in time to come for the conference. The organizers tried to rebalance the program, to recognize new efforts in astrophysics and ultra cold physics.

Elisabeth Dalimier from Université Pierre et Marie Curie organized the 17th ICSLS, which was held at the Henri Poincaré Institute in Paris from 21 to 25 June 2004. It was attended by 108 researches from 21 countries. An important event during the Conference was the symposium in
memory of Henri van Regemorter. The symposium began with the talk by D. Voslamber, the organizer of the 1973 Meudon Conference, usually referred to as the 1st ICSLS. He appreciated Henri van Regemorter’s kind assistance and steady encouragement during the whole preparatory phase. The next talk at the Symposium entitled “A Tribute to Henri Van Regemorter: Line Shapes, Collisions and Radiation” was given by S. Sahal-Brechot. Then F. Masnou-Seeuws presented a paper dedicated to Henri van Regemorter on “Making Ultracold Molecules with Chirped Pulses”. The invited and contributed papers presented at the Conference, including those given at Henri van Regemorter’s Symposium were published by “Editions Frontières” [17]. As a participant I still keep in my memory the social events that contributed to the splendid atmosphere during the Paris Conference: the cocktail at the Observatory on the eve of the opening ceremony, the River Seine Cruise, and the Concert and the Banquet Dinner at the Hôtel de Varengeville.

The 18th ICSLS was held during June 4 – 9, 2006 at the Auburn University in Auburn, Alabama, USA and was attended by 51 participants from 8 countries. The co-chairmen were Eugene Oks and Michael Pindzola from Physics Department of the Auburn University. Kay Niemr from Dortmund gave a talk under the title “Is there anything left to do in the 100 years old field of pressure broadening of atomic lines?”, in which he presented his personal view on the status of the research field founded by Lorentz in 1906. He indicated several experimental observations still lacking understanding and proper theoretical description. All papers are collected in the proceedings published by AIP [18].

Marco Gigosos and Manuel Gonzales from the Universidad de Valladolid in Spain organized the 19th ICSLS, which was held from 15 to 20 June 2008 at the Palacio de Congress Conde Ansúres in Valladolid. It was attended by 102 participants from 23 countries.

Since this conference took place exactly 50 years after the appearance of fundamental papers by Baranger and by Kolb and Griem a special panel discussion entitled “On the first 50 years of quantum theories of Stark broadening” was included in its program. The members of the panel were: J. Dufy (Gainesville), N. Konjević (Belgrade), V. Lisitsa (Moscow), and R. Stamm (Marseille). As previously the proceedings were published by AIP [19].

5. Summary
Unfortunately, I was unable to attend the 20th ICSLS in 2010 (St. John’s, Newfoundland, Canada) [20], the 21st in 2012 (St Petersburg, Russia) [21], and the 22nd in 2014 (Tullahoma, Tennessee, USA) [22]. However, from information I received second hand, I learned that these conferences were very successful. The main conclusion that can be drawn from the Proceedings of these Conferences is that despite of more than 100 years of its existence, the field of pressure broadening and shifting of spectral lines is still alive. Obviously, the field has changed considerably since 1956 when the first conference dealing with pressure effects on spectral lines took place. On the experimental side, the advent of new techniques such as cavity ring-down spectroscopy or optical-frequency comb spectroscopy, has yielded in recent years experimental data with such high accuracy that in many cases they represent a challenge to theory. On the theoretical side, much progress has been achieved in interatomic and intermolecular interaction calculations.

In the last three decades, there has been an explosion of new topics both in the field of Stark broadening in plasmas and the broadening by neutrals as well as in the area of their applications in astrophysics. Of particular importance are the topics dealing with line shapes associated with ultracold collisions between atoms confined in traps, especially those connected with problems of photoassociation of cold atoms and Bose-Einstein condensates. To my knowledge, the field of ultracold collisions appeared for the first time in the program of our conferences at the 9th ICSLS in 1988 when Paul S. Julienne and Alan Gallagher discussed the role of light interacting with very cold colliding atoms and showed that processes associated with resonance line broadening can play an important role in optical trap dynamics. Since then the research field of cold atoms has been constantly expanding and I am indeed glad to notice that the relevant topics are included in the program of the present conference. I also believe that as topics of major interest they should constitute issues for special sessions at future meetings in the ICSLS series.

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