

薩本棟先生事略

葉企孫

(清華大學物理系)

1949年一月卅一日薩本棟先生病死在美國舊金山加省大學醫院裏。中國教育工作者、自然科學工作者，以及曾經聽過他的講演讀過他的著作的人，無論他們是在當時已解放的區域或尚未解放的區域，聽到了這個消息，心裏都非常悲痛。他的死使中國物理學界和電機工程學界失去了一個重要的研究工作者，中國的學術機關失去了一個能幹而且能盡力的行政工作者，中國的大學生失去了一位數理及工程方面的好教授。我們看他一生的工作，始終是不斷地貢獻他的全力。他的壽雖然不滿四十七歲，他所作的事業和研究工作確實不少。

1902年七月薩先生生於福建省閩侯的一個比較寬裕的家庭中。他很順利地受到小學教育和中等教育。1921年他在北京清華學校畢業，1922年被派到美國去留學，先後在史丹福大學及奧斯德工學院學習電機工程和物理學。他的興趣起初在電機工程；因為想更深入地研究，所以又推廣到物理學了。1927年得理學博士學位後，接受了一個很大的電機製造公司的聘約，做了一年研究工作，到1928年纔回國。

薩先生回國後的工作，可以分為三個時期來敘述。第一個時期是從1928年秋到1937年夏，在這九年中他擔任清華大學物理學教授。他曾經講授過的主要課程是大學普通物理、電磁學、和無線電原理。他講授普通物理時，準備充分，聲音宏亮，盡力于做表演，考試多而嚴，平時給與學生充分的發問機會。根據他的教授經驗，他寫了一部‘普通物理學’（上下二冊，商務印書館1933年出版），又寫了一部‘普通物理實驗’（商務印書館1935年出版）。這兩部書在國內甚為通行，到現在還是這樣。薩先生的研究工作在這一個時期中最為豐富、他一生共寫了二十二篇研究論文，內中有十五篇是在這個時期寫的。他研究了兩類問題。第一類是用雙矢量(dyadic)方法解決電路問題（十篇），第二類是關於各種真空管的性質和效能（四篇）。1935年薩先生利用了休假的機會，到美國俄亥俄州立大學電機工程學系去講學，所講的材料就是第一類問題。以後

他又彙集了關於第一類問題的研究成果，加以系統化，用英文寫成了一本專著，1939年在美國出版。薩先生在第一個時期的工作樹立了他的學術地位；他對於清華的學術環境是滿意的；他在師生中留下了很好的印象；他在清華物理學系創造了值得紀念的功績。他離開了清華以後，對於這個大學的重要事件，常在關心着，一直到他臨終的時候。

1937年六月南京政府任命薩先生為國立廈門大學校長。他對於教學及研究的熱忱與成就無疑地使當時的教育部決定了這個最適當的人選。在七七事變發生後的第五天，他離開了北平，去就他的新職，他的第二個時期（1937夏至1945夏）就緊張地開始了。他擔任廈大校長八年，實際在校七年，剛剛遇到了一個很困難的並且在遷徙中的時期，他為廈大盡了十二分的力，解決了許多困難，設法聘請到幾位好教師。但是廈大的教師還是不夠的，因此他須要自己擔任一班一年級的微積分。因為教本缺乏，他還編了一種微積分的講義，以後他拿講義整理成了一本書，這就是商務印書館在1948年所出版的‘實用微積分’。薩先生對於廈大真是做到了心力交瘁的地步，以致嚴重地影響了他的健康。在抗戰期中廈大雖沒有能大量發展，却有了重要的改進，樹立了良好的校風，1949年秋天薩先生的骨灰歸葬在廈大的校址內，在他所用盡心力的地方永留紀念，這是最適當不過的。

在第二個時期中，除了處理繁忙的行政工作外，薩先生還發表了五篇研究論文（論文第十八篇至第二十二篇），其中有三篇是屬於電路方面的，仍然繼續他已往的主要工作。1944年薩先生到美國去講學，先後在麻省理工大學及史丹福大學擔任訪問教授，他的講演題目是交流電機，以後他拿講演的材料整理成一本書，1946年在美國出版。薩先生在電機工程方面還有兩本中文著作；一是‘交流電路’，1948年正中書局出版；一是‘交流電機原理’，1949年商務印書館出版。

1945年夏天薩先生從國外飛回重慶。朋友們發現他對於回到廈大的興趣不太濃厚。當時在重慶的中央研究院剛要選聘一位總幹事，院內院外的科學家都認為薩先生是一位很適宜的人選，他就應允了中研院的聘請而開始他的第三個時期的工作。從1945年秋天到1948年十二月中旬，他替中研院辦了兩件繁重的事：一件是復員，一件是在南京建立一個數理化中心。正在國民黨發動內戰的時候，他竟能籌到款項，為數學研究所及物理研究所在南京九華山附近各造了一所房屋。他雖然沒有能看到這兩所房屋得到充分的利用，這樣的建設終是對於國家有益處的。

對於中國物理學會，薩先生也盡心盡力地在多方面做了重要的貢獻。從1932年到1937年，他先後擔任學會的會計同秘書。從1942年起又先後擔任學報委員會委員同學會副理事長。從1946年起到他病重的時候，他擔任名詞審查委員會委員兼幹事。他對於物理學專門名詞的繙譯問題，常有很大的興趣。

薩先生在清華擔任教授的時候已經有胃病了。但是他的身體，一般說來，是強健的。誰也沒有想到他的胃病是屬於癌性的。他愛好運動，特別喜歡打網球。他的夫人黃淑慎女士也是一位體育家。薩先生的球技很好。在清華園內，遇有空暇，他常同他的哥哥，有機化學家本鐵先生，練習打網球，同別隊比賽，常得勝利。加上他對於業務的努力，使人不容易想到在他的胃裏已潛伏了一種重病。因此，他的病完全給耽誤了。這真是不幸之至！

尤其令人傷心的是他剛剛死在中國逢到大轉變的時候。他沒有看到新中國的建立，沒有參加新中國的建設工作。他的才幹，對於自然科學在新中國的新生應該是一個巨大的力量，然而已無從發生作用了。他已過世了，但是祖國的自然科學界是忘不了他的功績的。

一九五〇年七月二十七日于清華園

附：薩先生的著作表 (LIST OF DR. SAH'S WORKS)

I. 書 (Books)

- 普通物理學，上下兩冊(商務 1933). (General physics)
- 普通物理實驗(商務 1935). (Laboratory course in general physics)
- Dyadic circuit analysis (International Textbook Co. 1939).
- Fundamentals of alternating current machines (McGraw-Hill 1946).
- 交流電路(正中 1948). (Alternating current circuit)
- 實用微積分(商務 1948). (Practical calculus)
- 交流電機原理(商務 1949). (Principles of alternating current machines)

II. 論文 (Papers)

- Studies on sparking in air, *Trans. A.I.E.E.* **46** (1927), 604-615.
- A note on the unbalancing factor of three-phase systems, *Trans. A.I.E.E.* **47** (1928), 343.
- Representation of polyphase systems by multidimensional vectors, *Proc. World Engineering Congress, Tokyo* **22** (1929), 111-124.
- Application of space vectors to the solution of three-phase networks, *Science Reports, Tsing Hua Univ.* **A**, **1** (1931), 69-82.

5. The performance characteristics of linear triode amplifiers, I and II, *Science Reports, Tsing Hua Univ.* **A**, **2** (1933), 49-73, 83-103.
6. On a necessary condition for the maintenance of oscillations in class C linear triode oscillators, *Science Reports, Tsing Hua Univ.* **A**, **2** (1934), 269-275.
7. The modulation characteristic of linear triode oscillators, *Science Reports, Tsing Hua Univ.* **A**, **2** (1934), 277-288.
8. Representation of Stokvis-Fortescue transformation by a dyadic and the invariants of a polyphase impedance, *Science Reports, Tsing Hua Univ.* **A**, **3** (1935), 27-36.
9. Reciprocals of incomplete dyadics and their application to three-phase electric circuit theory, *Science Reports, Tsing Hua Univ.* **A**, **3** (1935), 37-55.
10. Equivalent three-phase networks, *Science Reports, Tsing Hua Univ.* **A**, **3** (1935), 57-63.
11. Impedance dyadics of three-phase synchronous machines, *Science Reports, Tsing Hua Univ.* **A**, **3** (1935), 127-178. (in collaboration with C. Yen 嚴曄).
12. Dyadic algebra applied to 3-phase circuits, *Trans. A.I.E.E.* **55** (1936), 876-882.
13. Analysis of unsymmetrical machines, *Trans. A.I.E.E.* **55** (1936), 1247-1248.
14. Complex vectors in 3-phase circuits, *Trans. A.I.E.E.* **55** (1936), 1356-1364.
15. Discussions on Kron's paper and on Sah's papers no. 12, 14, *Trans. A.I.E.E.* **56** (1937), 619, 1030-1031.
16. Quasi-transients in class B audio-frequency push-pull amplifier, *Proc. I.R.E.* **24** (1936), 1522-1541.
17. Experimental note on reactance of salient-pole alternators, *Science Reports, Tsing Hua Univ.* **A**, **4** (1937), 1-3.
18. Matrices and dyadics, *Elec. Eng.* **59** (1940), 329-330.
19. Two-phase coordinates of a three-phase circuit, *Elec. Eng.* **59** (1940), 478-480.
20. A matrix theorem, *Elec. Eng.* **60** (1941), 615-616.
21. A uniform method of solving cubics and quartics, *Amer. Math. Monthly* **52** (1945), 202-206.
22. 'Diamond Seven'-chart for electrical computation, *Elec. World* **124** (1945), 100-101.

DR. A. PEN-TUNG SAH,
a brief biographical note

By CHI-SUN YEH

Department of Physics, National Tsing Hua University

On January 31st, 1949, Dr. A. Pen-Tung Sah died in the University of California Hospital in San Francisco. At hearing the news, Chinese educational and scientific workers and others who had attended his lectures and/or read his writings were stricken with deep sorrow. His death was the loss of an important research worker in the fields of physics and electrical engineering in China, that of an able and conscientious administrator in Chinese institutions of learning, and that of a great teacher of mathematics, physics, and engineering to Chinese university students. Throughout his life, his devotion to work was ceaseless and undivided. He accomplished very much, indeed, both in administration and research in his short span of forth-seven years.

Dr. Sah was born in July, 1902 in a fairly well-to-do family of Foochow, capital of Fukien. He had a successful course of primary and secondary education. He was graduated from the then Tsing Hua College in 1921, and in 1922 sent on a government scholarship to America, where in Stanford University and Worcester Polytechnical Institute he pursued electrical engineering and, as his work progressed and his interest widened, physics. After receiving his Doctorate of Science in 1927, he did research in a large electric manufacturing company for one year before he came back to China.

Dr. Sah's work after his return to China may be conveniently divided into three periods. In the first period, which covered nine years from the autumn of 1928 to the summer of 1937, he was professor of physics in National Tsing Hua University. His chief courses were General Physics, Electricity and Magnetism, and Principles of Radio. His lectures

in General Physics were always well prepared, delivered in a rich voice, and illustrated with many demonstrations. Examinations were strict and frequent after ample opportunities had been provided for the students to raise questions. Based on his teaching experience, he wrote *General Physics* (Commercial Press, 1935) and *Laboratory Course in General Physics* (Commercial Press, 1935). These books were widely used after publication and are still so today. In this period, Dr. Sah's research was the most fruitful, yielding fifteen papers out of a total output of twenty-two. Two sorts of problems occupied his interest. On the one hand, he solved problems of electric circuit by the dyadic method (ten papers) and on the other he studied the properties of the vacuum tube (four papers). The former served as the material of his lectures in the Electrical Engineering Department of Ohio State University in 1935 while he was on a sabbatical leave from Tsing Hua. Later the substance of these papers was developed into a book in English (*Dyadic Circuit Analysis*, International Textbook Co., 1939). Dr. Sah's work in the first period established his reputation as a scientist. He was well pleased with the environment of Tsing Hua, which is congenial to scholarship. On his colleagues and students in Tsing Hua, he made a very good impression, especially in the Physics Department, where he achieved many things worthy of his name. After he left Tsing Hua, he continued to take interest in the important aspects of her development right up to the time of his death.

In June, 1937, Dr. Sah was appointed President of Amoy University by the Nanking Government. His interest and accomplishment in teaching and research assured the Ministry of Education of a most fitting choice for the post. Five days after the Japanese invasion at Lukouchiao, he left Peiping for his new duties. So at this moment of national crisis, began his second period, which lasted from the summer of 1937 to the summer of 1945. For seven years during his tenure of office, he carried Amoy University through a difficult and migratory period. Here he surmounted innumerable difficulties. He succeeded in engaging several good teachers. But as they were insufficient in number, he had to teach one section of Freshman Calculus himself. For lack of textbooks, he even wrote for the course a textbook which was published by the Commercial

Press in 1948. In Amoy University, he strained his mental and physical powers to the limit, seriously impairing his health. Though the development of the university was limited by war conditions, important improvements were made and order and discipline were established. To the campus of Amoy University, the remains of Dr. Sah most appropriately returned for burial in the summer of 1949.

In the midst of administrative labours, Dr. Sah managed to publish five papers (Papers Nos. 18-22), three of which were a continuation of his previous studies of electric circuit. In 1944, Dr. Sah went to America as Visiting Professor in Massachusetts Institute of Technology and Stanford University. His lectures were given on the subject of alternating current machinery and were developed into a book which saw print in America in 1946. Dr. Sah wrote two other books in Chinese on electrical engineering and they are *Alternating Current Circuit* (Cheng Chung, 1948) and *Principles of Alternating Current Machines* (Commerical Press, 1946).

On Dr. Sah's return to Chungking from abroad, friends found him not over-anxious to go back to Amoy University. Meantime, the post of Director-General of Academia Sinica had just been left vacant. It was agreed among all scientists in the academy and out that Dr. Sah would be the right candidate. So he was appointed and his acceptance of the new post marked the beginning of his third period. From the autumn of 1945 to the middle of December of 1948, two heavy tasks took up his whole time. One was the return of the academy to Nanking and the other the establishment of a centre of mathematics, physics, and chemistry. Even at a time the Kuomintang army was initiating civil war, he succeeded to obtain a grant for erecting two buildings to house the Institute of Mathematics and the Institute of Physics in the environs of Chiuhuashan, Nanking. Although he did not see them put to full use, he was convinced of their benefit to the country.

To the Chinese Physical Society, Dr. Sah made important contributions in various capacities. He was Vice-President in 1946, Secretary from 1936 to 1937, and Treasurer from 1932 to 1935 and from 1942 to 1943. He served on the Board of Editors of the Chinese Journal of

Physics from 1944 to 1945. From 1946 to the time of his collapse, he was Chairman of the committee for standardizing Chinese terminology in physics, taking a deep interest in this work.

Dr. Sah suffered from stomach ailments as early as during his teaching days in Tsing Hua. But, his general physique being strong, no one suspected them to be cancerous in nature. He was a lover of sports, especially tennis, which he played skilfully with his wife, *née* Miss Shu-Shen Huang, and his brother Peter Pen-Tieh Sah, an organic chemist. The Sah brothers had constant practice together and as partners of a double, they seldom met their peers. As Dr. Sah was never lax in his work, the possibility of incipient cancer was easily overlooked. It is to be regretted that his death was caused by insufficient medical attention before it was too late.

It is even more to be regretted that his death occurred on the eve of Chinese liberation. He did not live to see the founding of the New China or participate in national reconstruction. A talent which could become a power in the renaissance of natural science in the New China is, alas, vanished. Dr. Sah is dead but his achievements shall not be forgotten in the realm of natural science in China.

Tsinghuayuan, 27 July, 1950.