Shang-keng Ma Papers

Special Collections & Archives, UC San Diego
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Descriptive Summary

Languages: English

Contributing Institution: Special Collections & Archives, UC San Diego

9500 Gilman Drive

La Jolla 92093-0175

Title: Shang-keng Ma Papers

Identifier/Call Number: MSS 0100

Physical Description: 2.8 Linear feet(7 archives boxes)

Date (inclusive): 1966-1983

Abstract: The papers of Shang-keng Ma document Professor Ma's professional career at the University of California, San Diego and his standing in the international community of theoretical particle physicists. The papers cover the years 1966-1983 and are restricted to Ma's professional life.

Scope and Content of Collection

The Shang-keng Ma Papers are a record of Professor Ma's professional career at the University of California, San Diego and his standing in the international community of theoretical particle physicists. Covering the years 1966-1983, the collection is arranged in seven series: 1) BIOGRAPHY, 2) ADMINISTRATIVE MATERIALS, 3) CORRESPONDENCE, 4) SUBJECT FILES, 5) NOTES, 6) TEACHING MATERIALS, and 7) PUBLICATIONS.

SERIES 1: BIOGRAPHY

BIOGRAPHY holds a single document called "Remembering Shang-keng Ma," a memorial pamphlet containing a brief biography of Ma and remembrances by family members, colleagues and friends from all over the world recognizing his scientific achievements and personal strengths.

SERIES 2: ADMINISTRATIVE MATERIALS

This series contains Ma's bibliographies, departmental biographies and promotions, curriculum vitae, notices of doctoral committee assignments, and interdepartmental memos.

SERIES 3: CORRESPONDENCE

Early CORRESPONDENCE is sorted by topic into "general" and "research" categories, then arranged chronologically. Ma's practice after 1979 of filing his correspondence together regardless of subject has been maintained.

General correspondence contains Ma's letters to and from researchers and visiting professors he sponsored, colleagues at other universities, and the administrators of his department. In addition, this subseries includes Ma's letters to editors and publishers of scientific journals in his capacity as a referee. Also included are Ma's recommendation of Bernd Matthias for a Nobel Prize in physics and a letter to Ma's congressman protesting the violation of human rights in Israel.

Research correspondence is composed of letters from physicists who followed Ma's research closely and asked him specific questions regarding his calculations and findings. Ma's responses are not included in the collection. Correspondence regarding Ma's articles and books can be found in the PUBLICATIONS SERIES.

SERIES 4: SUBJECT FILES

The SUBJECT FILES series is arranged alphabetically by general subject titles. Chinese Issues contains "open letters" to President Nixon and the UCSD student paper protesting the United States' intention to give the Ryukyu Islands off the coast of China to the government of Japan. Also here is a letter widely circulated to faculty members of Chinese descent from the Chinese Students Association in Houston. Grant files contain Ma's records of his Sloan fellowship, the NSF award which funded the writing of *Statistical Mechanics* in Chinese, and other grant applications and materials. Visiting Professors and Researchers files contain letters and forms inviting and arranging collaboration at UCSD with scientists from other countries, including Pierre Pfeuty, Amnon Aharoney, Yoseph Imry, and Gene Mazenko.

SERIES 5: NOTES

NOTES contains seven folders of undated note pads containing Ma's calculations.

SERIES 6: TEACHING MATERIALS

Professor Ma's teaching materials originally included numerous mimeographs of quizzes, tests, and homework problems. One copy of each was retained in the collection. Ma taught graduate courses in "Theoretical Mechanics" and "Many-body Theory," and undergraduate courses in "Thermal Physics," Natural Science," and "Science and Technology." His course materials, arranged by class in chronological order, contain tests, homework problems, handouts, some lecture notes, and teaching evaluations completed by his students. One folder contains materials from Ma's sabbatical at Tsing Hua University in Taiwan--an outline for his book, *Statistical Mechanics*, and course materials he used there.

SERIES 7: PUBLICATIONS

This series is arranged in two subseries: A) Writings and B) Correspondence.

A) Writings includes Ma's doctoral thesis, original manuscripts, two unpublished articles and typescript drafts of his books, *Modern Theory of Critical Phenomena* and *Statistical Mechanics*.

Correspondence holds reviews of the first book, letters to editors, to referees and to the English translator of *Statistical Mechanics*. Originally, articles in the PUBLICATIONS series were organized chronologically by title, each folder containing numerous reprints, photocopies, and occasionally, related correspondence. Photocopies and most reprints have been removed from the collection. Original drafts and unpublished articles have been retained. Related correspondence has been consolidated into a few folders except for book-related correspondence, which is kept separate.

Biography

Shang-keng Ma (9/24/40-11/24/83) was born in Chungking, China, and came to the United States in 1959. He earned degrees in physics from the University of California, Berkeley (B.A. 1962 and M.A. 1966). In 1966 Ma joined the University of California, San Diego physics department as an assistant researcher in Keith Brueckner's research group. He was promoted to faculty status in 1967 and remained with the physics department until his death in 1983.

During his career at UCSD, Ma was also a visiting professor at Princeton's Institute for Advanced Study (1968-1969 and 1970), at Cornell University (1972), at the University of California, Berkeley (1973-1974), at CEN Saclay in France, at Tsing Hua University, Taiwan (1977-1978 and 1981), and at IBM - Watson Research Center in Yorktown Heights, New York (1981). It was at Cornell that Ma became involved in the work for which he won the greatest acclaim: amplification and extension of Kenneth Wilson's pioneering work in renormalization group theory of critical phenomena. Renormalization group theory (RG) is applicable to many areas within theoretical physics; Ma focused on its applications to critical phenomena.

Critical phenomena are highly unusual. Many substances have phase transitions that are commonly observable, such as the transition of water to steam. Critical phenomena involve phase transitions that, under certain circumstances, exhibit unique characteristics. Water, for example, can appear as a milky and turgid substance, given the presence of specific values of critical exponents. Five critical exponents, or factors, give rise to the diversity of critical phenomena observed by physicists in such areas as fluid and ferromagnetic systems. The study of critical phenomena has focused on determining the quantitative value of these factors. RG is the first theory that has been able to predict quantitative values for each of the critical exponents. Ma's work between 1972 and 1976, which culminated in the publication of his book *Modern Theory of Critical Phenomena* (1976), provided a much-needed introduction and clarification of the application of renormalization group theory to the study of critical phenomena. During his research at CEN Saclay, Ma developed the Monte Carlo renormalization group technique, combining two previously unrelated techniques into a single tool that is now commonly used in the quantitative study of critical phenomena.

Ma's career reflects a commitment to the importance of pedagogy. He wrote *Modern Theory of Critical Phenomena* as a textbook for graduate students. Later, Ma set aside his study of critical phenomena in order to write another physics textbook, this time in Chinese. This undertaking reflects Ma's interest in "the development of the Chinese language for use in modern science...." He noted in an application for a Guggenheim grant that the lack of Chinese-language texts seriously limited Chinese students' acquisition of scientific knowledge, reducing science classes to murky discussions of imprecisely understood concepts and rote memorization of formulae. Ma believed that writing a textbook in Chinese would make a dual contribution. It would introduce (old as well as new) terminology that was at once scientifically correct and intelligible in Chinese, and it would introduce new developments in science to the Chinese-speaking world. Surprisingly, *Statistical Mechanics*, which appeared in English in 1985, does not include discussion of Ma's work on renormalization group theory or critical phenomena.

Publication Rights

Preferred Citation

Shang-keng Ma Papers, MSS 100. Special Collections & Archives, UC San Diego.

Acquisition Information

Acquired 1988.

OFF-SITE STORAGE

COLLECTION STORED OFF-SITE. ALLOW ONE WEEK FOR RETRIEVAL OF MATERIALS.

Subjects and Indexing Terms

Physics -- Study and teaching

Physicists -- Biography

Mathematical physics
Renormalization group
Particles (Nuclear physics) -- Research
Critical phenomena (Physics)
Wilson, Kenneth G. (Kenneth Geddes), 1936-2013 -- Correspondence
De Dominicis, Cirano -- Correspondence
Amit, D. J., 1938-2007 -- Correspondence
University of California, San Diego -- Faculty -- Archives
Ma, Shanggeng, 1940-1983 -- Archives
University of California, San Diego -- History -- Archives
University of California, San Diego. Department of Physics -- Archives

Box 5, Folder 5	**Physics 140B - Thermal Physics Winter 1976**
Box 5, Folder 6	**National Tsing-Hua University - Visiting Chair 1977 - 1978**
Box 5, Folder 7	**Physics 210A - Statistical Mechanics Winter 1980, 1982**
Box 5, Folder 8	**Physics 210B - Statistical Mechanics Winter 1980**
Box 5, Folder 9	**Physics 211 - Solid State Physics Winter 1980, 1982**
Box 5, Folder 10	**Physics 255 - Theoretical Solid State Physics Seminar Spring 1980**
Box 5, Folder 11	**Physics 203B - Advanced Classical Electrodynamics Spring 1982**

PUBLICATIONS

Writings

Box 6, Folder 1	**Correlations of Photons from a Thermal Source - Thesis 1966**
Box 6, Folder 2	**Correlation Energy of an Electron Gas with Varying High Density 1967**
Box 6, Folder 3	**Second Sound in a Low Temperature Weakly Interacting Bose Gas 1971**
Box 6, Folder 4	**Transverse Waves in a Weakly Interacting Bose Gas 1972**
Box 6, Folder 5	**Electron Motion in a Random Potential and Critical Phenomena for n=0 1973**
Box 6, Folder 6	**Renormalization in the Large N-Limit 1973**
Box 6, Folder 7	**1/n Expansion 1975**
Box 6, Folder 8	**Random Field Instability of the Ordered State of Continous Symmetry 1975**
Box 6, Folder 9	**Effects of Random Impurities on Long Range Order 1978**
Box 6, Folder 10	**Dynamics of a Vector Spinglass Model Calculation of Entropy by Coincidence Count 1980**
Box 6, Folder 12	***Modern Theory of Critical Phenomena* - Chapters 1-5 1976**
Box 7, Folder 1-3	***Modern Theory of Critical Phenomena* - Chapters 6-14 1976**
Box 7, Folder 4	***Statistical Mechanics* 1983**

Correspondence

Box 7, Folder 5	**Mailing list for reprints**
Box 7, Folder 6-7	**Publications 1971 - 1982**
Box 7, Folder 8	***Modern Theory of Critical Phenomena* 1974 - 1980**
Box 7, Folder 9	***Statistical Mechanics* 1983**