

# **Carl Eckart Papers**

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Prepared by Donna Ellis

## Collection Summary

**Title:** Carl Eckart Papers

**Span Dates:** 1921-1973

**Bulk Dates:** (bulk 1935-1970)

**ID No.:** MSS65557

**Creator:** Eckart, Carl, 1902-

**Extent:** 8,400 items ; 24 containers plus 1 oversize ; 13 linear feet

**Language:** Collection material in English, and German

**Location:** Manuscript Division, Library of Congress, Washington, D.C.

**Summary:** Physicist, oceanographer, and educator. Correspondence, writings, lectures, subject files, biographical information, printed material, photographs, and other material relating to Eckart's career as oceanographer and physicist.

## Selected Search Terms

The following terms have been used to index the description of this collection in the Library's online catalog. They are grouped by name of person or organization, by subject or location, and by occupation and listed alphabetically therein.

### People

Dirac, P. A. M. (Paul Adrien Maurice), 1902-1984.

Eckart, Carl, 1902-1973.

Heisenberg, Werner, 1901-1976.

Lorentz, H. A. (Hendrik Antoon), 1853-1928.

Millikan, Robert Andrews, 1868-1953.

Oppenheimer, J. Robert, 1904-1967.

Pauli, Wolfgang, 1900-1958.

Schrödinger, Erwin, 1887-1961.

Sommerfeld, Arnold, 1868-1951.

Von Neumann, John, 1903-1957.

Wigner, Eugene Paul, 1902-

### Organizations

General Dynamics Corporation.

Institute for Defense Analyses.

National Academy of Sciences (U.S.). Committee on Science and Public Policy.

Rand Corporation.

Scripps Institution of Oceanography. Marine Physical Laboratory.

Scripps Institution of Oceanography.--Faculty.

United States. Office of Scientific Research and Development. National Defense Research Committee.

University of California (1868-1952) War Research Division.

University of Chicago Faculty.

### Subjects

Atomic bomb.

Geophysics.

Oceanography.

Physics.

Quantum theory.

Science--History.

Science--Societies, etc.

Submarine warfare.

Thermodynamics.

Universities and colleges--California.

Universities and colleges--Illinois.

World War, 1939-1945--Naval operations--Submarine.

## **Titles**

*Johns Hopkins University/Applied Physics Laboratory series in applied mathematics and mechanics.*

## **Occupations**

Educators.

Oceanographers.

Physicists.

# **Administrative Information**

## **Provenance**

The papers of Carl Eckart, physicist and oceanographer, were bequeathed to the Library of Congress in 1974.

## **Copyright Status**

The status of copyright in the unpublished writings of Carl Eckart is governed by the Copyright Law of the United States (Title 17, U.S.C.).

## **Access and Restrictions**

The papers of Carl Eckart are open to research. Researchers are advised to contact the Manuscript Reading Room prior to visiting. Many collections are stored off-site and advance notice is needed to retrieve these items for research use.

## **Preferred Citation**

Researchers wishing to cite this collection should include the following information: Container number, Carl Eckart Papers, Manuscript Division, Library of Congress, Washington, D.C.

# **Biographical Note**

<i>Date</i>	<i>Event</i>
1902, May 4	Born, St. Louis, Mo.
1923-1925	Ph.D. in physics, Princeton University, Princeton, N.J.
1926	Married Edith Louise Frazee (divorced 1948)
1927-1928	Studied in Berlin, Germany, as a John Simon Guggenheim Memorial Foundation fellow
1928-1946	Professor of physics, University of Chicago, Chicago, Ill.
1934-1935	Sabbatical to attend Institute for Advanced Study, Princeton University (also in 1952-1953 and 1960-1961)
1942-1946	Assistant (and eventually director), War Research Division, University of California, San Diego, Calif.
1946-1952	Director, Marine Physical Laboratory, University of California, San Diego, Calif.
1946-1971	Professor of geophysics, Scripps Institution of Oceanography, University of California, San Diego, Calif.
1952	Elected member of the National Academy of Sciences

1958	Married Klara Dan Von Neumann (died 1963)
1960	<i>Hydrodynamics of Oceans and Atmospheres</i> (Oxford: Pergamon Press. 290 pp.)
1965-1967	Vice-chancellor for academic affairs, University of California, San Diego, Calif.
1966	Awarded Alexander Agassiz Medal by National Academy of Sciences for contributions to oceanography
1972	Awarded William Bowie Medal by American Geophysical Union for outstanding contributions to fundamental geophysics
1973, Oct. 23	Died, La Jolla, Calif.

## Scope and Content Note

The papers of Carl Henry Eckart (1902-1973) span the years 1921-1973, with the bulk of the items concentrated in the period 1935-1970. Included are biographical data, correspondence, lectures and writings, and subject files.

Eckart's distinguished career as a physicist and physical oceanographer spanned fifty years. His academic career, his involvement with professional organizations, and his achievements are noted in the [Biographical Data](#) series. Due to the classified nature of some of his research projects, Eckart had to submit detailed security clearance forms. These, in addition to biographical statements for the University of California, various professional directories, and newspaper articles, yield much information. Eckart authored more than seventy articles between 1923 and 1970. His published works are listed in a bibliography in this series. Photographs (1921-1973) of Eckart, his family, and colleagues are included here. His significant achievements are recorded in several awards and certificates of merit (1944-1971), including one signed by President Harry Truman (1948) located in an oversize box. A folder of miscellaneous items contains his mother's will (1953) and a statement (1971) regarding his decision in 1941 to withdraw from the "Uranium Committee" of the National Defense Research Committee and the infant Manhattan Project because of his anti-atomic bomb sentiments.

The [General Correspondence](#) series contains letters from Eckart's colleagues and copies of his replies. Subject matter revolves around research interests, academic affairs, and the internal management of professional organizations. There is little personal correspondence. Significant correspondents include P. A. M. Dirac (a 1935 letter discussing the "Compton effect" and the interaction of radiation with electrons), Werner Heisenberg (a 1936 letter stating the uncertainty of his plans to visit the United States and a 1948 letter in German regarding a publication honoring Arnold Sommerfeld), Robert Andrews Millikan (a 1934 letter commenting on Eckart's paper on cosmic-ray curves), Wolfgang Pauli (eight letters from 1935 to 1936 discussing the symbolic logic method's relation to physics, Albert Einstein's opposition to the quantum theory, Heisenberg's cosmic ray showers, and the Copenhagen conference of physicists), Erwin Schrodinger (a 1935 letter citing a published source for a 1919 speech), Arnold Sommerfeld (several 1936 letters in German), and Eugene Paul Wigner (an undated letter regarding his work on the representations of the Lorentz group in Hilbert space).

Eckart was on the faculty of the University of Chicago during the years when that institution was supervising the development of nuclear energy at the Oak Ridge National Laboratory (then known as the Clinton Laboratories) in Oak Ridge, Tennessee. He remained in touch with his former colleagues in this field even though he changed to the study of physical oceanography. In 1949 Alvin Weinberg offered Eckart the directorship of the Theoretical Division of the laboratory. Eckart declined the position, and his response, dated 12 May 1949, summarizes his philosophy of science and, in particular, his dissatisfaction with nuclear physics and "Big Science."

Reprints of Eckart's scientific articles (1923-1968) are bound in four volumes and placed at the beginning of the [Lectures and Writings](#) series. The rest of the series contains, in alphabetical order by topic, Eckart's mathematical calculations, notes, outlines, drafts, and correspondence relating to his publications, classroom lectures, and research projects.

Early in his career Eckart was involved in theoretical physics. At the University of Chicago, he taught courses in electrodynamics and circuit theory. During the 1930s his research revolved around the developing field of quantum

physics--the nature of the atom and its components. By the end of that decade he had become interested in thermodynamics and had published a series of articles under the general title of "The Thermodynamics of Irreversible Processes."

World War II was a turning point in Eckart's career. Prior to its official involvement, the United States engaged in war preparations, including the formation of the National Defense Research Committee in 1940. Eckart served on this so-called "Uranium Committee" as a consultant to the subsection on the theory of nuclear chain reactions. At a meeting of physicists and chemists held at the University of Chicago during Christmas week 1941, Arthur H. Compton and J. Robert Oppenheimer announced a reorganization of the program, which would become known as the Manhattan Project. Although the atom bomb was not specifically mentioned at this meeting, Eckart realized that such a device could and would be developed. Opposed to such an action, he withdrew from the project and became associated with the underwater detection of submarines at the War Research Division of the University of California.

It was through this detection work that Eckart became interested in the physical properties and dynamics of oceans. After the war (1946), he left the University of Chicago to become director of the Marine Physical Laboratory of the University of California, and then director of the Scripps Institution of Oceanography, also affiliated with the University of California. He made a significant contribution to geophysics by linking theoretical hydrodynamic exercises to actual physical properties of water. The following decades were devoted to research on thermal layering in the oceans and atmospheres (which led to his only book in 1960), the transmission of sound in the sea, turbulence, the generation and structure of surface and internal ocean waves, and air-sea interaction.

Late in his career (1970s), Eckart acquired an interest in the origin and development of exact sciences. This interest is reflected in the [Lectures and Writings](#) series under such topics as calendars (1971), history of science (1971-1973), origins of geometry (1971-1972), and the problem of Plato (1971-1973).

Eckart's participation in numerous organizations is documented in the [Subject File](#) series. In 1952 he was elected to the National Academy of Sciences and served on several of its committees. His work on the Committee on Science and Public Policy is particularly noteworthy and is represented by correspondence, memoranda, meeting agendas, reports, and notes on meetings and conversations with colleagues. Additional material was collected into a scrapbook (1967-1972), which covers such topics as the environment and use of the earth's resources, financial support of research, education of future scientists, relationship of the scientific community to government, and technology and progress versus social responsibility in light of the Vietnam War and the arms race.

Eckart also served as the University of California's alternate representative to the Institute for Defense Analyses (1967-1968). The institute, made up of twelve member universities, functioned as an independent source of studies and advice for the Department of Defense. The IDA's largest section was the Weapons Systems Evaluation Division, which produced technical, operational, and economical analyses of various weapons (including ballistic missiles), tactical strategies, and logistics. Other sections prepared studies on economic, political, and communication matters relating to national security. Eckart served at a time when, pressured by anti-Vietnam War sentiments and congressional opposition, the IDA took measures to diversify its work to include nondefense activities. The IDA file contains minutes, reports, and Eckart's summaries of the institute's actions.

The [Subject File](#) series contains material pertaining to Eckart's activities as a reviewer for scientific journals (1958-1972), a consultant for commercial firms such as General Dynamics Corporation and the Rand Corporation (1959-1970), and as a member of the Editorial Advisory Board for the Johns Hopkins University Applied Physics Laboratory's series on applied mathematics and mechanics (1957-1959).

Eckart's long relationship with Pergamon Press, the publisher of his book on oceans and atmospheres, is illuminated by correspondence and contracts (1958-1972). Apparently, other publishers solicited the manuscript, which became a standard work on the subject.

The file pertaining to the prominent mathematician, John Von Neumann, consists chiefly of Eckart's contribution toward publishing some of Von Neumann's works posthumously. Eckart later married Von Neumann's widow, Klara.

A brief correspondence between Eckart and J. Robert Oppenheimer appears in the file on sabbaticals. During his 1952 sabbatical, Eckart was invited to join the School of Mathematics at the Institute for Advanced Study, Princeton University. The letters discuss Eckart's proposed research plans.

Also of interest in the [Subject File](#) series are Eckart's notes (1928) compiled during his stay in Berlin, Germany, as a John Simon Guggenheim Memorial Foundation fellow, a patent (1953) he received with George W. Downs for an echo-ranging system, and notes (1926-1927) written by Nobel Prize-winner, Hendrik Antoon Lorentz, using some of Eckart's equations for his calculations.

## Organization of the Papers

The collection is arranged in five series:

- [Biographical Data, 1921-1973](#)
- [General Correspondence, 1934-1972](#)
- [Lectures and Writings, 1923-1973](#)
- [Subject File, 1926-1972.](#)
- [Oversize, 1948-1970](#)

## Description of Series

<i>Container</i>	<i>Series</i>
BOX 1	<b><u>Biographical Data, 1921-1973</u></b> Security clearances, directory listings, university biographies, and publicity; publication lists; photographs of Eckart, his family and colleagues; certificates and awards; and miscellany. Arranged by type of item, then chronologically.
BOX 1-2	<b><u>General Correspondence, 1934-1972</u></b> Letters to and from professional colleagues. Arranged alphabetically by name of correspondent.
BOX 2-20	<b><u>Lectures and Writings, 1923-1973</u></b> Bound volumes of published articles, arranged chronologically; and unbound calculations, notes, outlines, drafts, and correspondence relating to Eckart's research endeavors and classroom lectures. Arranged alphabetically by subject.
BOX 20-24	<b><u>Subject File, 1926-1972</u></b> Correspondence, memoranda, and reports relating to various scientific and academic associations; agreements, correspondence, and reports pertaining to consultant work for companies and organizations; Eckart's reviews of colleagues' articles; agreements, royalty statements, and correspondence concerning Eckart's publications; and data for registering a patent. Arranged alphabetically by subject or type of material, then chronologically.
BOX OV 1	<b><u>Oversize, 1948-1970</u></b> Computer print-outs and certificates.

# Container List

<i>Container</i>	<i>Contents</i>
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BOX 1-2	<b>General Correspondence, 1934-1972</b> Letters to and from professional colleagues. Arranged alphabetically by name of correspondent.
BOX 1	A-J, 1934-1972 (10 folders)
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BOX 2-20	<b>Lectures and Writings, 1923-1973</b> Bound volumes of published articles, arranged chronologically; and unbound calculations, notes, outlines, drafts, and correspondence relating to Eckart's research endeavors and classroom lectures. Arranged alphabetically by subject.
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## Lectures and Writings, 1923-1973

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  - Of mechanistic physics, undated
  - Of the kinetic theory, 1938
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- Measurement and detection of steady ac (alternating current) and dc (direct current) signals in noise, 1951
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  - For the electron theory of material, 1937
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- On the relations between stability,  $\sigma_T$  and entropy, undated
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- Ordinary differential equations, 1967
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  - Thermodynamics (introduction to article by Leo Szilard), 1971
  - "Thermodynamics of Irreversible Processes," 1940, 1956
  - "Thermodynamics of Irreversible Processes" (V. Shock waves and phase boundaries), 1967-1968
  - Thermodynamics of systems with a finite number of degrees of freedom, undated
  - Tidal theory, 1966
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  - Turbulence in shallow rotating basins, 1969
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  - "What Is Science and What It Is Not," 1963
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*Hydrodynamics of Oceans and Atmospheres*, Russian edition, 1967  
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Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Md., Advisory Editorial Board, 1957-1959  
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#### **Oversize, 1948-1970**

Computer print-outs and certificates.

#### BOX OV 1

Certificate of merit, signed by President Harry Truman, 1948  
Computer print-outs  
Eastern North Atlantic temperature and salinity, 1957-1958  
Geophysical time series, circa 1963  
Sound channel programs, 1970