

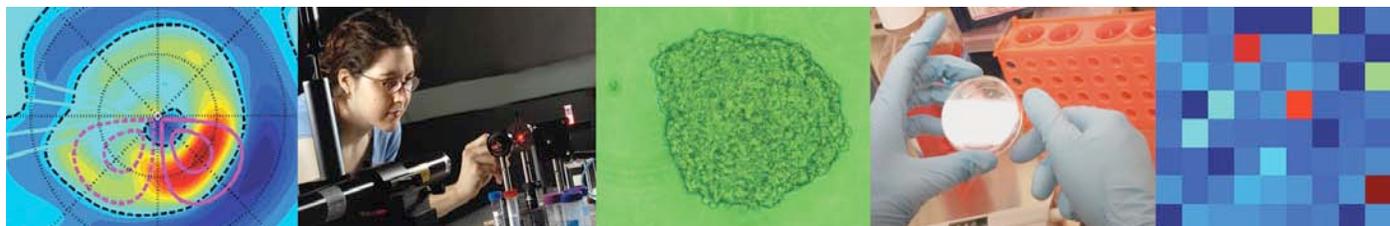
**“A Life Dedicated to Science”  
Edward Teller Centennial Symposium  
May 28, 2008, Livermore, CA**



## **Prof. Edward Teller and Higher Education**

**John F. Holzrichter**

**President, Fannie and John Hertz Foundation**



# Prof. Edward Teller's formative experiences and educational accomplishments

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- Hungarian years 1908 - 1926
- German education 1926 - 1933
- Britain, Copenhagen and America 1933 - 1941
- Chicago and Los Alamos 1942 - 1951
- Livermore and UC - 1952 -> 1975 -> 1991
  - LLNL's scientific leadership, as Director, vigilance
  - Teaching at UC Berkeley
  - UCB Space Sciences & Nuclear Engineering 1958
  - Hertz Foundation Graduate program 1963
  - UC Davis Dept. of Applied Science at LLNL 1963
- Final Years 1991 to 2003 - end of cold war, but...

**'Major technological advances are built on foundations of basic knowledge'**

# **Hungarian Years 1908-1926: Culture, Chaos, and his “Diaspora”**

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- **Born into professional, multilingual, loving, demanding, “middle-European” family**
- **Experienced an intellectual’s education in the best gymnasiums of the Austro-Hungarian empire - Modernist, Socratic, Humanistic, Prussian methods**
- **Chaotic society as result of WW-I treaty and the dissolution of Austro-Hungarian empire**  
e.g. In Hungary, anti-Semitism intensifies and spreads.
- **Teller leaves Hungary when he is 18 (many of his family & friends die in the ensuing horrors of fascism & communism)**

# **German Years 1926 to 1933: “There at the beginning of time” re modern physics**

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- **“Selected out” for university training in mathematics and physics in Germany**
- **University training:**
  - **Karlsruhe 1926 - Herman Mark, Ewald, Boehm**
  - **Munich 1928 - Sommerfeld**
  - **Leipzig 1928 - Heisenberg**
  - **Göttingen 1930 - Eucken, Franck, Born**
  - **Copenhagen 1934 - Bohr**
- **Teller participates in the development, application, and extension of quantum physics to many real world problems => Applied Science**

# German Years 1926 to 1933 (cont. )

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- **Incredible network of colleagues from this period:**
  - Fermi, Szilard, Wigner, von Neumann, Gamow, Bethe, Franck, von Weizsäcker, Landau, Placzek, von Karman, Göppert-Mayer, Wheeler, Weisskopf, Lawrence...
- **Passion for learning, for applying quantum mechanics to unsolved problems, and for teaching**
- **After 1930, anti-Semitism grows rapidly in Germany**

# British and American Universities 1933 to 1941

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- The British “Jewish Rescue Committee” supports his escape, first to Copenhagen, then to London
- Joins Washington University (Wash. DC) at invitation of Gamow, 1935 to 1940, teaches quantum mechanics, then moves to Columbia
- Works with scientists from the Carnegie Foundation, NBS, and others, learning geophysics, surface physics, molecules ...
- He mentors several great students in the prewar and postwar period: C.N.Yang, Rosenbluth, Kantrowitz.....

# Los Alamos, Chicago, and “the Bomb” 1942 to 1952

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- To U. of Chicago to work with Fermi and on the Manhattan project
- To Los Alamos in 1943
- Return to U. of Chicago in 1946 as professor - worked w/ Fermi , Göppert-Mayer, and others
- To Los Alamos in 1950 (after 1st Russian Test), argues the need for more intellectual leadership
- Passionate about understanding fusion: hampered by inadequate physics, math, computing tools, & **trained staff**; as well as politics, ethics, management, espionage.....

# UC Berkeley and the Livermore Laboratory Years: 1952 to 1975

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- Lawrence and Teller start “2nd Lab”, on the American applied-science model
- Teller becomes Professor at UC, teaching advanced QM (physics 221 e.g., w/ Mark, Talley as TAs), and other courses

*‘because he had internalized QM so completely, he taught it in an extraordinary manner’*  
ref. H. Mark & M. May
- Teaches Physics 10 at UCB in early 1960’s (with such famous students as Ms. Barbara Gregg Holzrichter)

# **UC and Livermore Laboratory Years: 1952 to 1975 (cont. )**

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- **US completely reexamines its views toward higher education as result of WWII, Cold War....**
  - **mass education vs master/apprentice?**
  - **applied vs basic?**
  - **US starts many focused labs.**
- **Edward helps start Space Sciences Lab and Dept of Nuclear Engineering at UCB, ~ 1958**
- **Crisis in 1971: An over-Production of S&T PhD's by 1971 ( I was one of them...)**
- **Retires from LLNL in 1975, becomes Emeritus at LLNL, UC, and a research fellow at Hoover**

# Prof. Edward Teller at Livermore, 1957

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# Promoting Applied Science:

## 1) Hertz Foundation 1957 and 1963

- Hertz Foundation was started by John Hertz in 1957 to help the US compete with Soviet advances in military technology.
- Prof. Teller joined its Board of Directors, steered it to support graduate Fellows in 1963, and became head of its selection program.
- Started with engineering emphasis, but today it supports graduate students in the applied physical, biological, and engineering sciences.

**The Fannie and John Hertz Foundation has spent > \$120M supporting >1050 Fellows: still “going strong”**

## **2) Started UCD Dept. of Applied Science at LLNL in 1963 ; he was its 1st Chair**

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- **Need to teach LLNL staff those many concepts not taught in universities at that time**
- **Provided advanced degree opportunities, attracting talented students to its unique facilities, teachers, etc. - > 210 PhD's**
- **Early faculty included - Johnson, Kirschbaum, May, Kaufman, Furth, Talley, Alder, Killeen, Post..**
- **Applied science and inter-disciplinarity has been difficult for Universities to manage - still is**
- **DAS did its job at LLNL. It is now mostly centered at the UC Davis campus**

# **The Cold War and “The Long Wait ” 1963 to 1991**

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- **From atmospheric test-ban treaty in 1963 until the collapse of the Soviet Union 1991**
- **Concerned with courage, vigilance, scientific competence, testing, modern defense.....**
  - All of which required intellectually talented people willing to dedicate themselves to difficult, politically unfashionable problems.**
- **Continues to support teaching, students, and a popular appreciation for science and technology**
- **Fall of Soviet Empire 1991 and a “Hero’s Welcome” in Hungary a few years later.**

# The Final Years - Concerns about:

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- **Attracting young people to science and engineering, and especially teacher training.**
  - Edward Teller Education Center at UCD-LLNL site,
  - Saturday science sessions, Illinois gifted students...
  - “ET would have taught kindergarten if asked” ref MW.
- **Expresses belief that gifted students need early and special training:**
  - ‘ The present US high school system wastes too many lives and wastes too much time ’
- **US population and politicians eschewing science, taking “easy way out”, not embracing S&T into its cultural core.**

# Prof. Edward Teller 1908 - 2003

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- A remarkable person, a remarkable career, a person who changed world history
- A great teacher, most effective in explaining real-world problems and urging people to solve them, or at the very least to deal with them !
- One of the great Leaders and Practitioners of Applied Science

Prof. Teller with  
Hertz Fellows, 2003



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**Documents: E. Teller “Memoirs”; “Applied Science and Technological Progress” report to US Congress 1957; “American Hegemony & the Postwar Reconstruction of Science in Europe”, John Krige; “The Dark Side of Physics” E.Teller and W.Talley, w/ W. Teller, C. Westbrook**

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