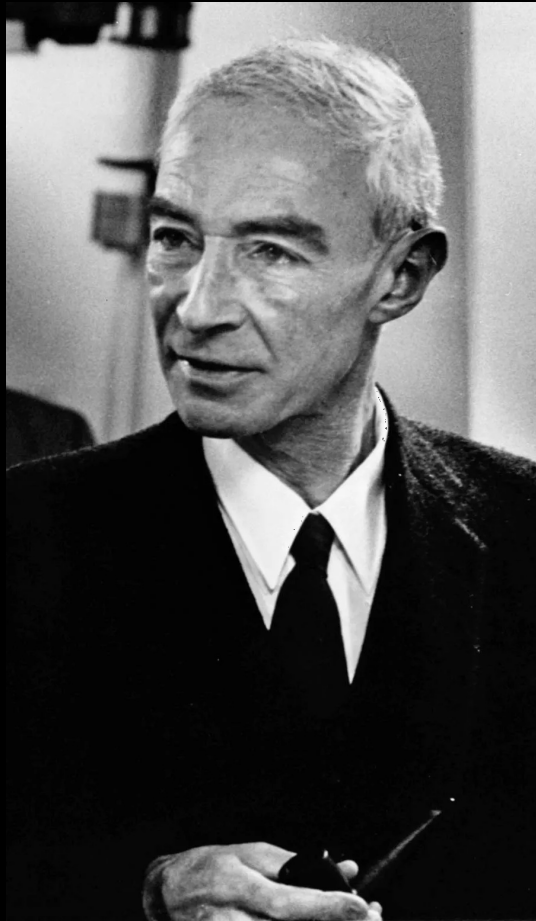


In the Shadow of the Bomb



Immanuel Kant (1724 - 1804)

- 1724 – Born, Königsberg, Prussia
- 1755 – Completes Degree at Königsberg
- 1755-1770 – Privatdozent at Königsberg
- 1770 – Chair of Logic and Metaphysics at Königsberg
- 1770 – *De mundi sensibilis atque intelligibilis forma et principiis (Inaugural Dissertation)*
- 1781 – *Kritik der reinen Vernunft*
- 1783 – *Prolegomena zu einer jeden künftigen Metaphysik*
- 1784 – *Beantwortung der Frage: Was ist Aufklärung?*
- 1785 – *Grundlegung zur Metaphysik der Sitten*
- 1786 – *Metaphysische Anfangsgründe der Naturwissenschaft*
- 1787 – *Kritik der reinen Vernunft*, second edition
- 1788 – *Kritik der praktischen Vernunft*
- 1790 – *Kritik der Urteilskraft*
- 1796 – Retired from Königsberg
- 1797 – *Metaphysik der Sitten*
- 1804 – Died, Königsberg, Prussia



What Is Enlightenment

Enlightenment is man's emergence from his self-imposed immaturity. Immaturity is the inability to use one's understanding without guidance from another. This immaturity is self-imposed when its cause lies not in lack of understanding, but in lack of resolve and courage to use it without guidance from another. Sapere Aude! "Have courage to use your own understanding!" – That is the motto of enlightenment.

Laziness and cowardice are the reasons why so great a proportion of men, long after nature has released them from external guidance, nonetheless gladly remain in lifelong immaturity, and why it is so easy for others to establish themselves as their guardians. It is so easy to be immature. If I have a book to serve as my understanding, a pastor to serve as my conscience, a physician to determine my diet for me, and so on, I need not exert myself at all.

Berlinische Monatschrift.

1784

Zwölftes Stük. December.

I.
Beantwortung der Frage:

Was ist Aufklärung?

(S. Decemb. 1783. S. 516.)

Aufklärung ist der Ausgang des Menschen aus seiner selbst verschuldeten Unmündigkeit. Unmündigkeit ist das Unvermögen, sich seines Verstandes ohne Leitung eines anderen zu bedienen. Selbstverschuldet ist diese Unmündigkeit, wenn die Ursache derselben nicht am Mangel des Verstandes, sondern der Entschließung und des Muthes liegt, sich seiner ohne Leitung eines andern zu bedienen. Sapere aude! Habe Muth dich deines eigenen Verstandes zu bedienen! ist also der Wahlspruch der Aufklärung.

Faulheit und Feigheit sind die Ursachen, warum ein so großer Theil der Menschen, nachdem sie die Natur längst von fremder Leitung frei gesprochen
D. Monatschr. IV. B. 6. St. Hh (na-

The Legacy of the Enlightenment

- “The truth shall set you free.” Knowledge is inherently conducive of emancipation.
- Knowledge is power.
- Knowledge is inherently conducive of progress.
- Pure knowledge is value neutral. All knowledge is worthy of pursuit.



Preliminary Comparisons

Bethe

- Child of the Enlightenment
- Universal truth
- Secure sense of self
- Anchor in integrity – Continued doing physics
- Outsider stance
- Valued community and fellowship – Built a strong community at Cornell

Oppenheimer

- Child of the Enlightenment, but develops into someone with a more modernist temperament
- Relativism
- Insecure sense of self
- Stopped doing physics
- Insider stance
- Valued community and fellowship –
But failed to build community at the Institute for Advanced Study

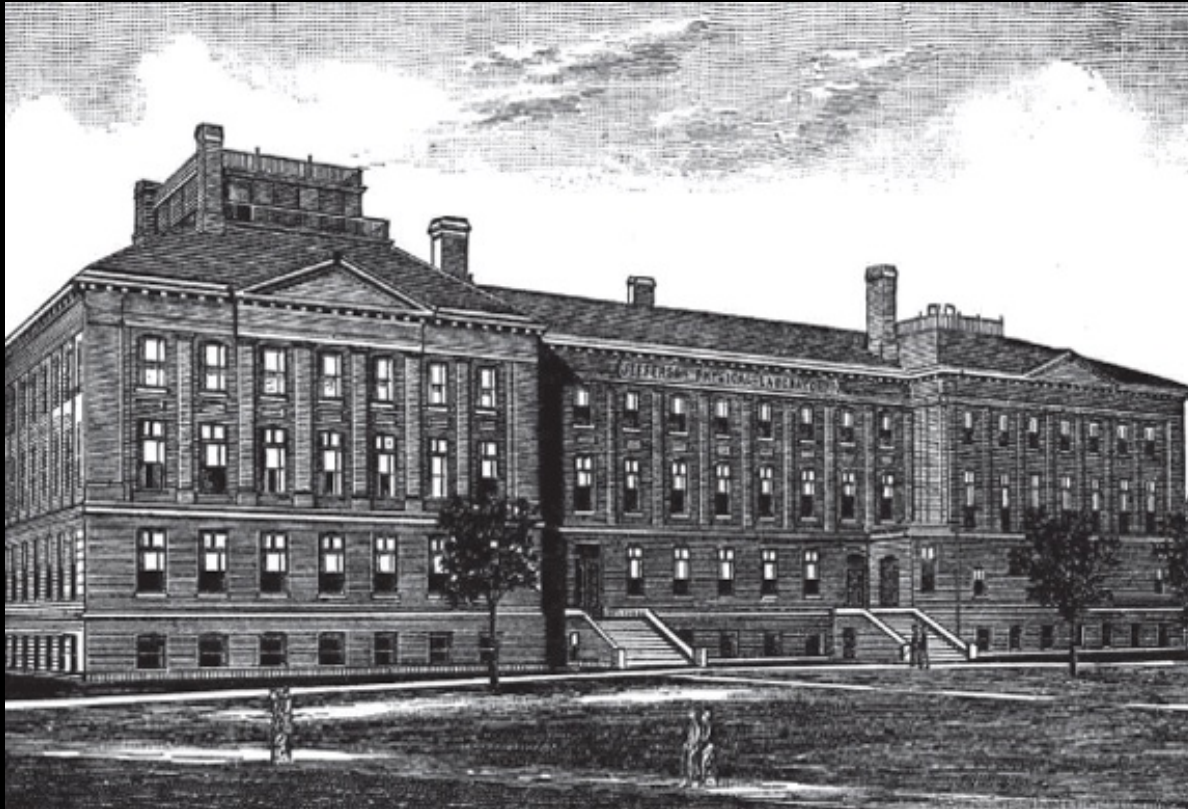
The Young Oppenheimer



Felix Adler and the Ethical Culture School



Oppenheimer at Harvard in the 1920s



Jefferson Physical Laboratory - Harvard

Oppenheimer at Göttingen



1927

Nº 20

ANNALEN DER PHYSIK VIERTE FOLGE. BAND 84

1. Zur Quantentheorie der Molekeln; von M. Born und R. Oppenheimer

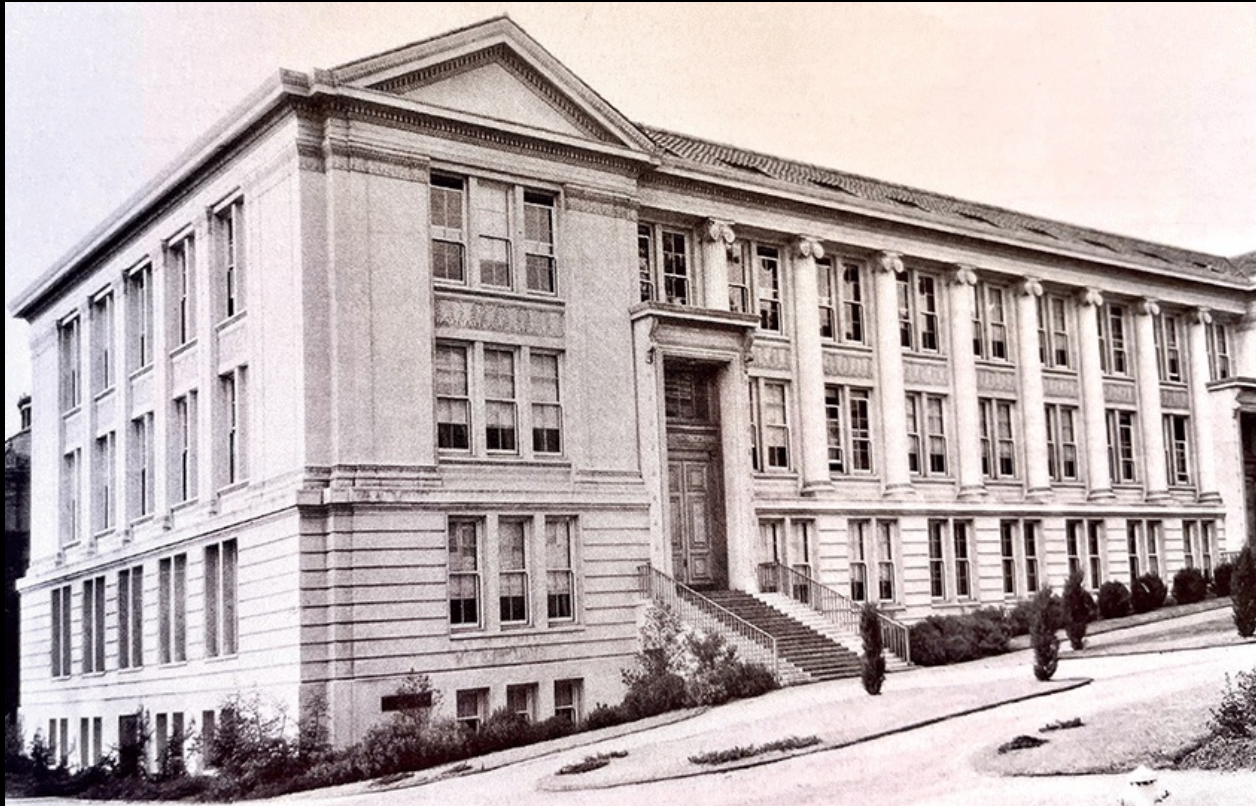
Es wird gezeigt, daß die bekannten Anteile der Terme einer Molekel, die der Energie der Elektronenbewegung, der Kernschwingungen und der Rotationen entsprechen, systematisch als die Glieder einer Potenzentwicklung nach der vierten Wurzel des Verhältnisses Elektronenmasse zu (mittlerer) Kernmasse gewonnen werden können. Das Verfahren liefert u. a. eine Gleichung für die Rotationen, die eine Verallgemeinerung des Ansatzes von Kramers und Pauli (Kreisel mit eingebautem Schwungrad) darstellt. Ferner ergibt sich eine Rechtfertigung der von Franck und Condon angestellten Betrachtungen über die Intensität von Bandenlinien. Die Verhältnisse werden am Beispiel der zweiatomigen Molekeln erläutert.

Einleitung

Die Terme der Molekelspektren setzen sich bekanntlich aus Anteilen verschiedener Größenordnung zusammen; der größte Beitrag rührt von der Elektronenbewegung um die Kerne her, dann folgt ein Beitrag der Kernschwingungen, endlich die von den Kernrotationen erzeugten Anteile. Der Grund für die Möglichkeit einer solchen Ordnung liegt offensichtlich in der Größe der Masse der Kerne, verglichen mit der der Elektronen. Vom Standpunkte der älteren Quantentheorie, die die stationären Zustände mit Hilfe der klassischen Mechanik berechnet, ist dieser Gedanke von Born und Heisenberg¹⁾ durchgeführt worden; es wurde gezeigt, daß die aufgezählten Energieanteile als die Glieder wachsender Ordnung hinsichtlich des Verhältnisses $\sqrt{\frac{m}{M}}$ erscheinen, wo m die Elektronenmasse, M eine mittlere Kernmasse ist. Dabei traten aber Kernschwingungen und Rotationen in der gleichen (zweiten) Ordnung auf, was dem empirischen Befund (bei kleinen Rotationsquantenzahlen) widerspricht.

1) M. Born u. W. Heisenberg, Ann. d. Phys. 74. S. 1. 1924.
Annalen der Physik. IV. Folge. 54. 30

Physics at Berkeley and Caltech in the 1930s



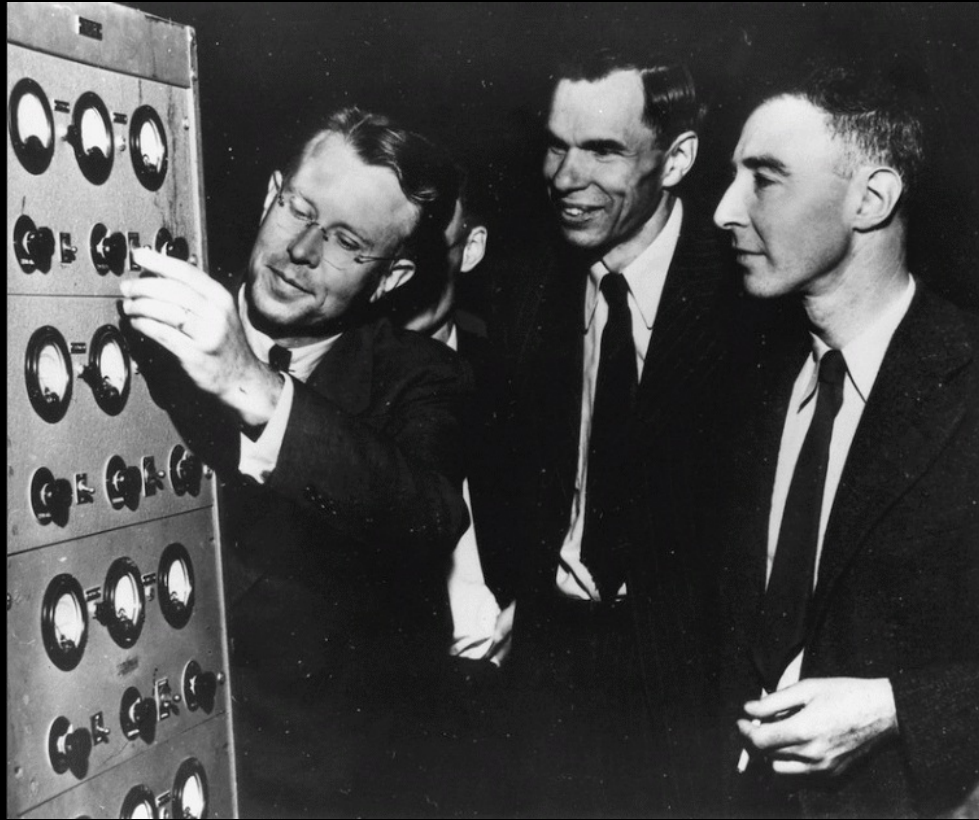
LeConte Hall - Berkeley

Physics at Berkeley and Caltech in the 1930s



Ronald and Maxine Linde Hall of Mathematics and Physics - Caltech

Oppenheimer at Berkeley and Caltech in the 1930s



Berkeley



Caltech

Oppenheimer in New Mexico in the 1930s



Oppenheimer and Ernest Lawrence

Wilhelm von Humboldt



1767-1835



Humboldt University - Berlin

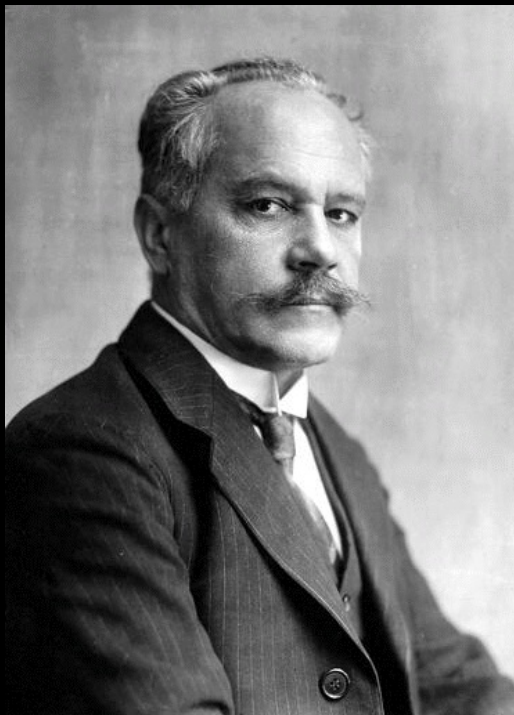
A Lexicon

- Bildung
- Kulturträger
- Gymnasium
- Mandarins
- Aufklärung
- Wissenschaft
- Ausserordentliche Professor
- Ordentlicher Professor
- Intellectual and cultural formation
- Bearer of culture
- High school emphasizing the humanities
- University faculty
- Enlightenment
- Science
- Associate professor
- Full professor

The Younger Hans Bethe



Bethe's Mentors



Arnold Sommerfeld
1868-1951



Patrick Blackett
1897-1974

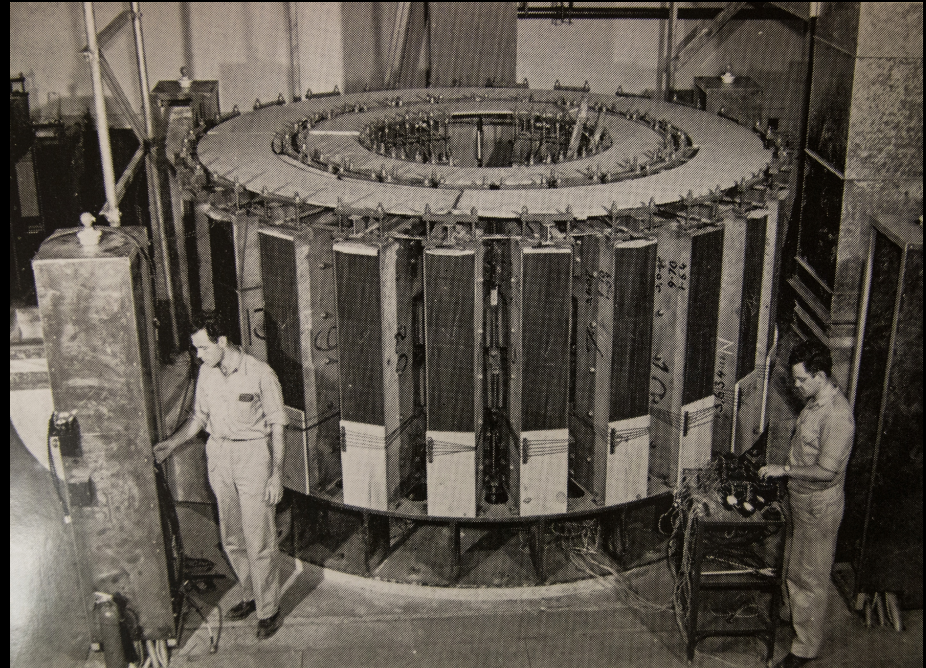


Enrico Fermi
1901-1954

The Newman Laboratory – Cornell



Opened in 1948



A Synchrotron in the Basement of Newman - 1949

The Newman Laboratory – Cornell



Bethe at the Groundbreaking in 1947

The Threat of McCarthyism



Senator Joseph McCarthy (1908-1957)

The Threat of McCarthyism



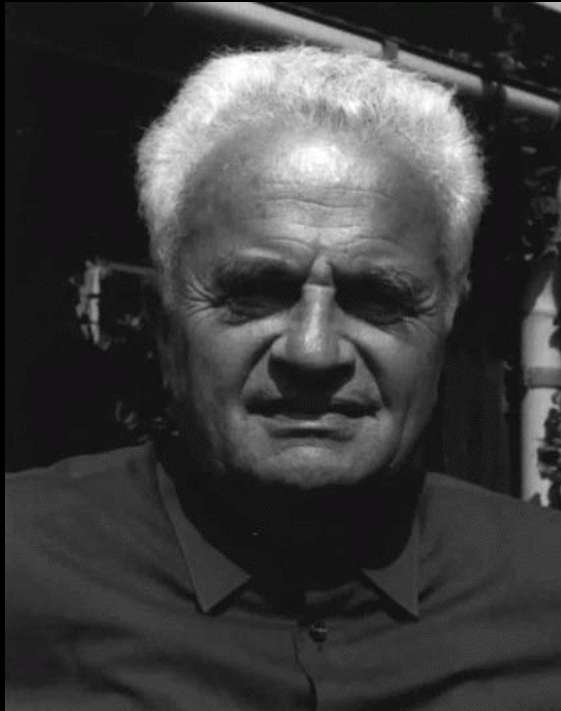
McCarthy with Roy Cohn, whom he hired as Chief Counsel
on the Permanent Subcommittee on Investigations

The Army-McCarthy Hearings



The Army-McCarthy Hearings, April 22 – June 17, 1954
<https://youtu.be/svUyYzzv6VI>

The Bernard Peters Case

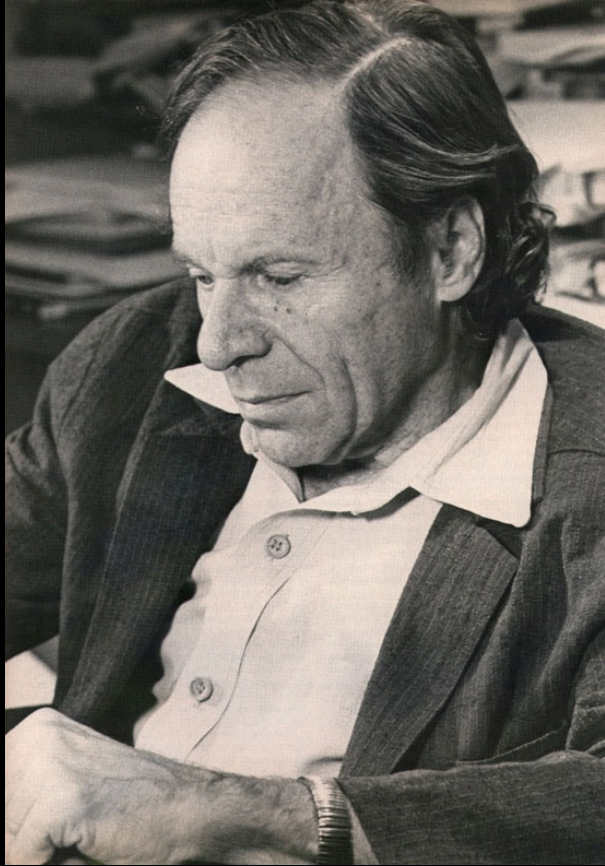


Bernard Peters (1910-1993)



Peters at the Silver Jubilee celebrations for the Tata Institute of Fundamental Research in Mumbai, 1970. He is speaking with the mother of the Institute's founder, Homi Bhabha

The Philip Morrison Case



Philip Morrison (1915-2005)



Morrison at the Trinity site,
July 1945

Fire Bombing of Hamburg



Operation Gommorah, July 27-28, 1943
37,00 killed, 180,000 wounded

Fire Bombing of Dresden



Operation Thunderclap, 13-15 February, 1945
25,000 killed



Fire Bombing of Tokyo



Operation Meetinghouse, March 9, 1945
70,000-150,000 killed

Jus ad bellum

Just cause - The reason for going to war needs to be just and cannot, therefore, be solely for recapturing things taken or punishing people who have done wrong; innocent life must be in imminent danger and intervention must be to protect life.

Comparative justice - While there may be rights and wrongs on all sides of a conflict, to overcome the presumption against the use of force, the injustice suffered by one party must significantly outweigh that suffered by the other.

Competent authority - Only duly constituted public authorities may wage war.

Right intention - Force may be used only in a truly just cause and solely for that purpose—correcting a suffered wrong is considered a right intention, while material gain or maintaining economies is not.

Probability of success - Arms may not be used in a futile cause or in a case where disproportionate measures are required to achieve success.

Last resort - Force may be used only after all peaceful and viable alternatives have been seriously tried and exhausted or are clearly not practical.

Proportionality - The anticipated benefits of waging a war must be proportionate to its expected evils or harms.

Childress, James F. (1978). "Just-War Theories: The Bases, Interrelations, Priorities, and Functions of Their Criteria." *Theological Studies*. 39 (3): 427–445. doi:10.1177/004056397803900302.

Jus in bello

Distinction - Just war conduct should be governed by the principle of distinction. The acts of war should be directed towards enemy combatants, and not towards non-combatants caught in circumstances they did not create.

Proportionality - Just war conduct should be governed by the principle of proportionality. Combatants must make sure that the harm caused to civilians or civilian property is not excessive in relation to the concrete and direct military advantage anticipated by an attack on a legitimate military objective.

Military necessity - Just war conduct should be governed by the principle of military necessity. An attack or action must be intended to help in the defeat of the enemy; it must be an attack on a legitimate military objective, and the harm caused to civilians or civilian property must be proportional and not excessive in relation to the concrete and direct military advantage anticipated.

Fair treatment of prisoners of war - Enemy combatants who surrendered or who are captured no longer pose a threat. It is therefore wrong to torture them or otherwise mistreat them.

No means "malum in se" - Combatants may not use weapons or other methods of warfare that are considered evil, such as mass rape, forcing enemy combatants to fight against their own side or using weapons whose effects cannot be controlled.

Childress, James F. (1978). "Just-War Theories: The Bases, Interrelations, Priorities, and Functions of Their Criteria." *Theological Studies*. 39 (3): 427–445. doi:10.1177/004056397803900302.

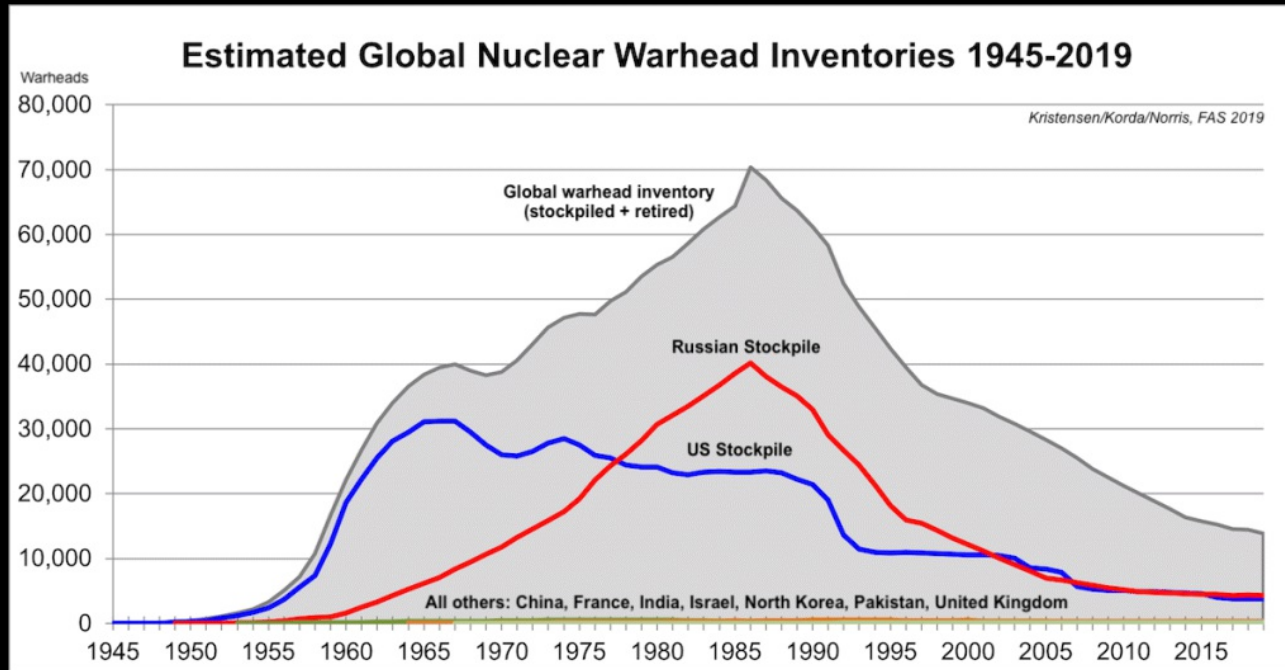
President John F. Kennedy
Signs the Limited Nuclear
Test Ban Treaty October 7,
1963



<https://www.jfklibrary.org/learn/about-jfk/historic-speeches/televised-address-on-nuclear-test-ban-treaty>

1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2020

LNTBT 1963 NPT 1970 SALT I 1971 SALT II 1979 INF 1988 START I 1991 CTBT 1996 START II 2000 SORT 2002 New START 2010



From 1971 to 2010 a series of nuclear arms control agreements led to a reduction in the number of warheads from a high of about 70,000 around 1996 to about 30,000 warheads by 2005, with approximately 3,200 of those warheads deployed, the rest in stockpiles.

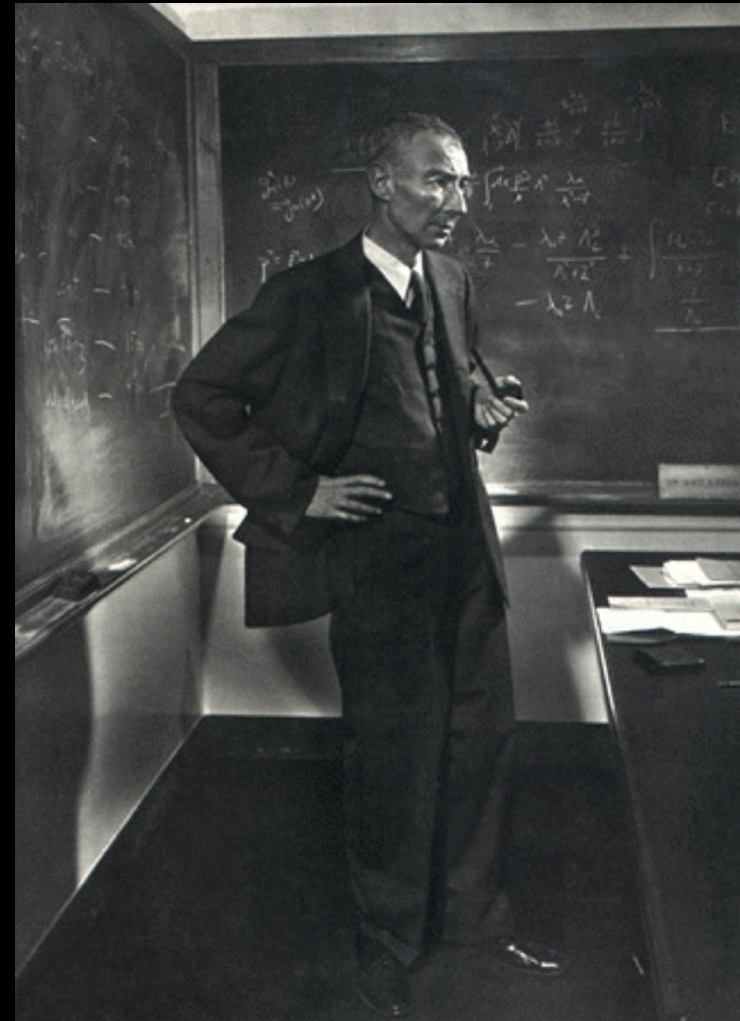
<http://www.johnstonsarchive.net/nuclear/nwhdet.html>

J. Robert Oppenheimer

“Physics in the Contemporary World.”

Arthur Dehon Little Memorial Lecture
Massachusetts Institute of Technology
November 25, 1947

Despite the vision and the far-seeing wisdom of our wartime heads of state, the physicists felt a peculiarly intimate responsibility for suggesting, for supporting, and in the end, in large measure, for achieving the realization of atomic weapons. Nor can we forget that these weapons, as they were in fact used, dramatized so mercilessly the inhumanity and evil of modern war. In some sort of crude sense which no vulgarity, no humor, no overstatement can quite extinguish, the physicists have known sin; and this is a knowledge which they cannot lose.



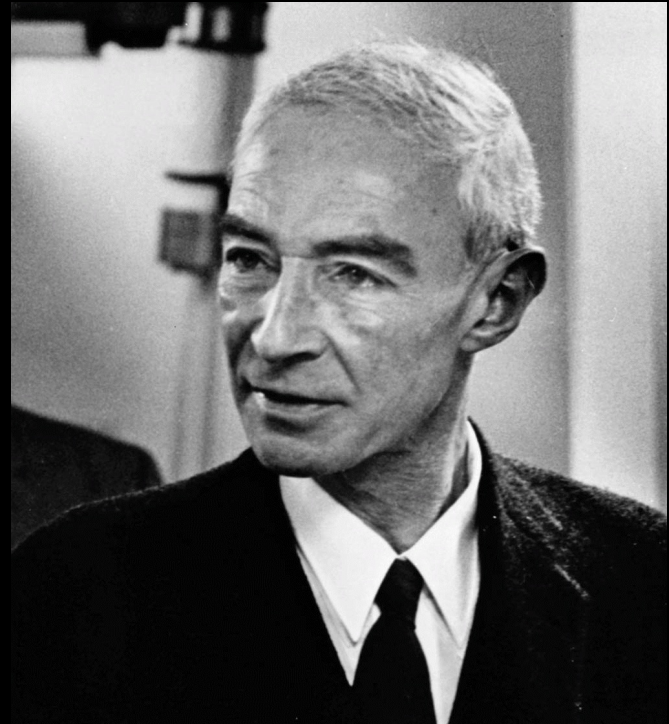
J. Robert Oppenheimer

“Physics in the Contemporary World.”

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The scientist should assume responsibility for the fruits of his work. I would not argue against this, but it must be clear to all of us how very modest such assumption of responsibility can be, how very ineffective it has been in the past, how necessarily ineffective it will surely be in the future. In fact, it appears little more than an exhortation to the man of learning to be properly uncomfortable; and, in the worst instances, is used as a sort of screen to justify the most casual, unscholarly and, in the last analysis, corrupt intrusion of scientists into other realms of which they have neither experience nor knowledge, nor the patience to obtain it.

The true responsibility of a scientist, as we all know, is to the integrity and vigor of his science.

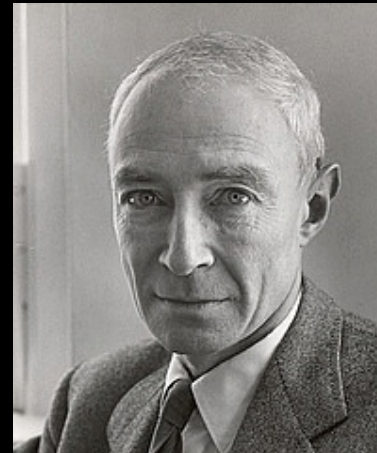


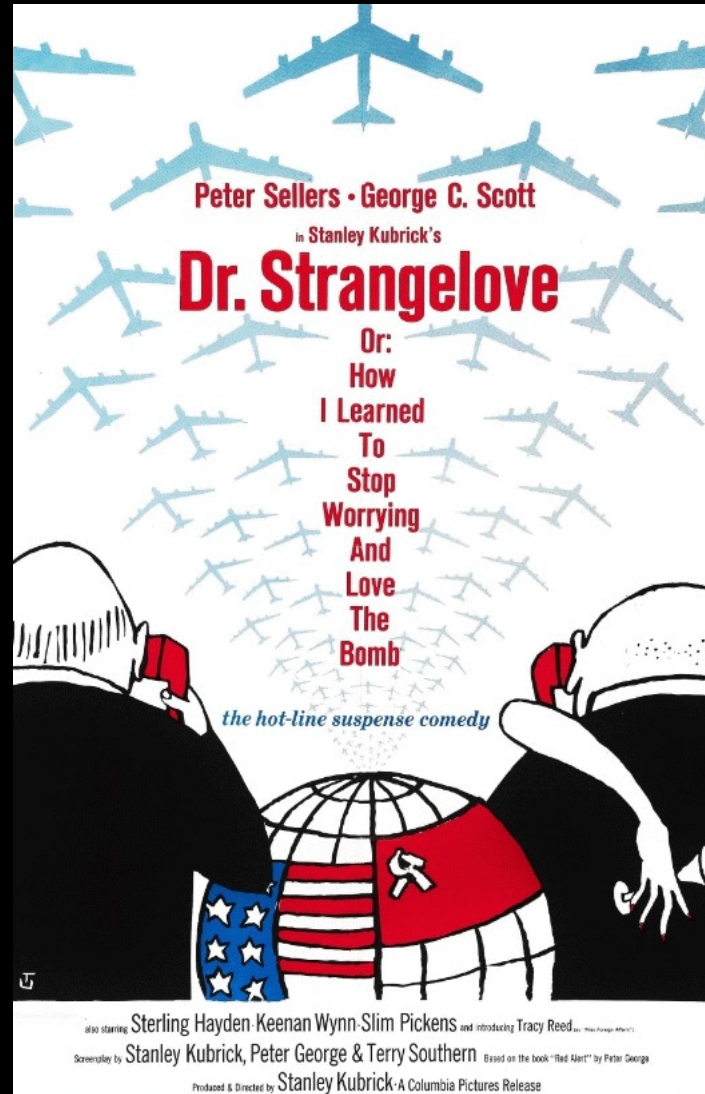
Schweber on Bethe and Oppenheimer

Making it possible for Bethe to act so decisively as a moral agent are his self-confidence, the force of his personality, and the support of the community he has helped to create at Cornell. All these were secured and nurtured by his powers and his continuing creativity and accomplishments as a scientist. His scientific labors are his anchor in integrity. Neither that anchor nor such a community was available to Oppenheimer after Los Alamos.

...

In this lecture [“Prospects in the Arts and Sciences, Christmas Day 1954] Oppenheimer had returned to Felix Adler’s call to strengthen the bonds between *all people* and to deepen their interconnectedness. *Bethe has lived the life that Oppenheimer had described.*





also starring Sterling Hayden-Keenan Wynn-Slim Pickens and introducing Tracy Reed aka George Adams
Screenplay by Stanley Kubrick, Peter George & Terry Southern Based on the book "Red Alert" by Peter George
Produced & Directed by Stanley Kubrick-A Columbia Pictures Release

The Real Dr. Strangeloves



Herman Kahn



Edward Teller



Werner von Braun

The B-52 Cockpit Controversy



A Real B-52 Cockpit



Major Kong's B-52 Cockpit