

MEI
Conference
2018

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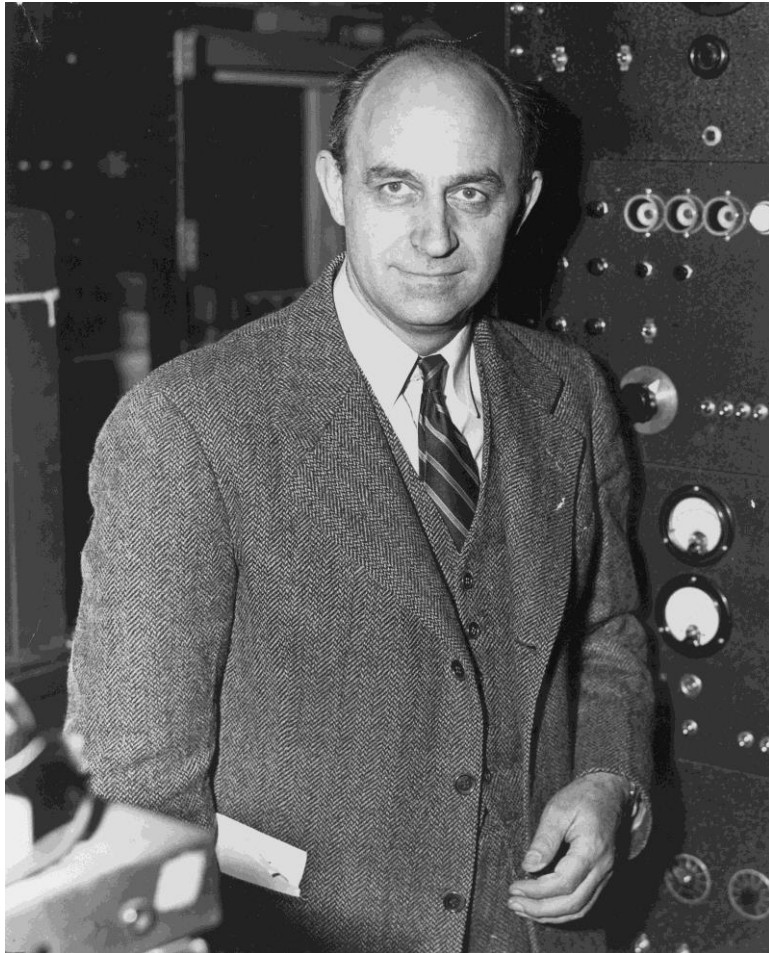
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Fermi Estimation

Tom Rainbow

Enrico Fermi (1901-1954)



Many things bear Fermi's name. These include the **Fermilab** particle accelerator and physics lab in Batavia, Illinois, which was renamed in his honor in 1974, and the **Fermi Gamma-ray Space Telescope**, which was named after him in 2008, in recognition of his work on cosmic rays. Three nuclear reactor installations have been named after him: the **Fermi 1** and **Fermi 2** nuclear power plants in Newport, Michigan, the **Enrico Fermi Nuclear Power Plant** at Trino Verclasse in Italy, and the **RA-1 Enrico Fermi** research reactor in Argentina. A synthetic element isolated from the debris of the 1952 Ivy Mike nuclear test was named **fermium**, in honor of Fermi's contributions to the scientific community. This makes him one of 16 scientists who have elements named after them.

Since 1956, the United States Atomic Energy Commission has named its highest honor, the **Fermi Award**, after him. Recipients of the award include well-known scientists like Otto Hahn, Robert Oppenheimer, Edward Teller and Hans Bethe.

Fermi Problems

Estimate how far a person is likely to walk in their lifetime. Show details of your assumptions and calculations.

km/life \approx 150 000 (allow 50 000 to 400 000)

The Dr Jo Problem

Before



After



The Wisdom Of The Crowd

Scoring:

- Closest to the mean – 5 Points
- Within 1 standard deviation of the mean – 3 points
- Within 2 standard deviations of the mean – 1 point

Play It Again, Sam– The Classic

How many piano tuners are there
in Chicago?

Assumptions

- There are approximately 9,000,000 people living in the Chicago metropolitan area.
- On average, there are two persons in each household in Chicago.
- Roughly one household in twenty has a piano that is tuned regularly.
- Pianos that are tuned regularly are tuned on average about once per year.
- It takes a piano tuner about two hours to tune a piano, including travel time.
- Each piano tuner works eight hours in a day, five days in a week, and 50 weeks in a year.

Of Mice And Men and Cows

"I was born right here in Southern California. My old man had a chicken ranch, 'bout ten acres. The white kids come to play at our place, an' sometimes I went to ... "

How many standard McDonald's burgers (ie not quarter pounders) can you get from an average cow?

“Have you ever wondered how many hamburgers come from one cow?”

An average cow, which yields about 200 kilograms (or 440 pounds) of usable meat, you could make 4,500 hamburgers or 1000 quarter pounders.”

Bounce Mozart

“It is estimated that by the age of 6, Mozart had clocked up an eye-watering 3500 hours of practice.”

Explore what his life would have been like in order to have achieved this.

Celestial Sand

The average galaxy contains 250 billion stars.

There are approximately 200 billion galaxies.

Are there more grains of sand on Earth than stars in the universe?

“The Earth has roughly (and we're speaking *very* roughly here) 7.5×10^{18} grains of sand, or seven quintillion, five hundred quadrillion grains.”

There are approximately 5×10^{22} stars in the known universe.