

## The Fine Tuning Argument

### 1. Some Very Precise Numbers

Einstein's equation  $e = mc^2$  contains the number 2.

Too small for life	Just right!	Too big for life
$e = mc^1$	$e = mc^2$	$e = mc^3$

Newton's Law of Gravity defines the force F between two objects  $x$  and  $y$  whose masses are  $m(x)$  and  $m(y)$  and which are separated by distance  $d(x,y)$ .

The Law of Gravity:  $F(x,y) = G \frac{m(x) \cdot m(y)}{d(x,y)^2}$

The Law of Gravity contains the number G which is the *gravitational constant*.

Too small for life	Just right!	Too big for life
$6.67383 \times 10^{-11}$	$6.67384 \times 10^{-11}$	$6.67385 \times 10^{-11}$

The *fine-structure constant*  $\alpha$  is important in physics.

It is defined like this:  $\alpha = \frac{e^2}{\hbar c 4\pi\epsilon_0} \approx \frac{1}{137.03599908}$

Too small for life	Just right!	Too big for life
$\frac{1}{137.03599907}$	$\frac{1}{137.03599908}$	$\frac{1}{137.03599909}$

### 2. The Fine Tuning Argument

The *Fine Tuning Argument* goes like this: (1) Our universe has certain features. These include (a) the fact that the universe is lawfully ordered; (b) the fact that the laws of nature have certain mathematical forms; (c) the values of the fundamental physical constants; (d) the fact that the universe starts in a low-entropy state. (2) These features are significant because if they were slightly different, then our universe would not contain any things that have value. The values include complexity, life, intelligence, rationality. (3) Since these features are significant, they require an explanation. These features raise the Leibnizian question: why is the universe the way that it is? (4) The best explanation is that there exists a FINE TUNER whose nature explains the significant features.

### **3. What is the Fine Tuner?**

*The Theistic Hypothesis:* The Fine Tuner is God.

*The Aliens Hypothesis:* The Fine Tuner is an alien civilization with technology powerful enough to design and create entire universes.

*The Necessity Hypothesis:* The Fine Tuner is some deeper necessary law.

*The Plenitude Hypothesis (The Multiverse Hypothesis):* All possible universes exist with all possible settings of the constants. No Fine Tuner is needed.

*The Lottery Hypothesis:* The constants were selected by a lottery in which we got lucky. No Fine Tuner is needed.

*The Fecund Universe Hypothesis:* The Fine Tuner is an evolutionary process in which mommy universes give birth to more finely tuned baby universes.

*The Digitalist Hypothesis:* The Fine Tuner is an algorithm running on some super-cosmic computer. The algorithm finely tunes all the numbers.