The Fermi Paradox
Where the hell is everyone?
Older than dirt (literally!)
The Drake Equation

\[ N = R^* f_p n_e f_i f_c L B_s \]

- **Number of Communicating Civilizations in Our Galaxy**
- **Probability that Life on a Planet Becomes Intelligent**
- **Number of Life-Supporting Planets per Solar System**
- **Amount of Bullshit You're Willing to Buy From Frank Drake**
The Drake Equation 2: Drake Harder

\[ N = R^* \times f_p \times n_e \times f_\ell \times f_i \times f_c \times L \]

\( N \) – number of advanced civilizations in our galaxy
\( R^* \) – average rate of star formation in our galaxy
\( f_p \) – fraction of stars that have planets
\( n_e \) – average number of planets that can potentially support life
\( f_\ell \) – fraction that develop life
\( f_i \) – fraction that develop intelligent life
\( f_c \) – fraction of technological civilizations
\( L \) – length of time such civilizations release detectable signals into space.
The Drake Equation 3: The Drakening

- Original numbers gave a value of 10
- Current estimates give 2.3 or lower
- ...these numbers don't mean much
Planets

- We can now see that lots of sunlike stars have planets
- Unfortunately, most of them are gas giants in very close orbits
- But that's very likely to be sampling bias, because those are the only ones we can detect
- Current conclusion: our solar system isn't particularly noteworthy, though maybe not common
Life

• Current theory suggests single-cell life develops about as soon as possible
• Multi-cellular life might be much harder
• This is why Mars and Europa are so important
Technological Civilization
Duration:
The Great Filter
We reject the Asimov rules for robots. We work for the rulers, not humanity.
Not all doom and gloom... maybe
What does this all mean?

- We're either very improbable ...
  - It is up to us to give the universe meaning

- ... or technological civilization as we understand it doesn't tend to last.
  - At the moment, I'd say resource depletion
  - 30 years ago, I'd have said nuclear war
  - 30 years from now, who knows?

- Either way, rather daunting.
The End