



**So... where is everybody?**

**Some final LIU N190 thoughts...**

# First we must dismiss UFO's...



Extraordinary claims require  
extraordinary evidence

To be scientifically acceptable, evidence  
must be:

Clear, repeatable, irrefutable, consistent

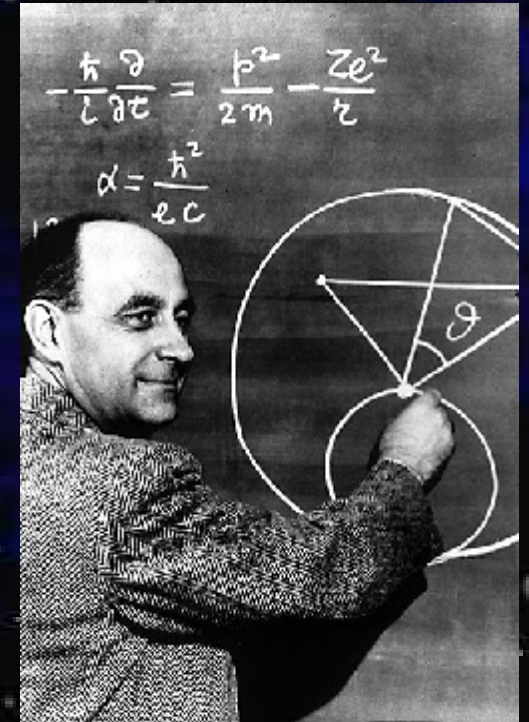
UFO sightings have not risen to the  
level of science.

# WHERE ARE THEY?

## Fermi Paradox (Enrico Fermi)

n If the existence of intelligent life in the universe is favorable...

then where is everybody?



# WHERE ARE THEY?

- n It is believed that we are biological “late comers” onto the scene.
- n If civilizations are common, many should have arisen long before us (by as much as billions of years!).
- n Galactic colonization should have occurred.  
Ex: 1%  $c$  travel could colonize entire galaxy in 100 million years

# WHERE ARE THEY?

Could be several reasons:

1. Maybe we ARE alone  
(SETI is a waste)

n Maybe we are the first... or  
the latest civilization

n Then we are unique and  
quite remarkable!



# WHERE ARE THEY?

2. Other civilizations exist but are not interested in exploration, colonization or communication. (SETI is a waste)

- n Technological difficulties: Difficulty of interstellar travel discourages interstellar travel

- n Sociological considerations (no desire to explore)

- n Self destruction

# WHERE ARE THEY?

3. There is a galactic civilization, but is deliberately avoiding us

n the Prime Directive or "zoo hypothesis"



§ The Sentinel Hypothesis (2001 Space Odyssey, Contact)

# SEMESTER SUMMARY

The origin of life might be reasonably common

- n The material of life is common

- n The energy of life is universal

- n Chemical nature of the origin of life

- n Environments similar to the earth might be reasonably common

- n Stars are numerous, the Universe is VAST

# SEMESTER SUMMARY

Stars are incredibly numerous

- n Occasional success in formation of intelligent life could lead to many different civilizations

The search for Life is in it's infancy

- n New technology awaits us

Interstellar travel is daunting

- n Might prohibit visitation of alien worlds or by aliens
- n Perhaps many others have tried and failed?

**Absence of evidence is NOT  
evidence of absence.**

**“The probability of success is  
difficult to estimate; but if we  
never search, the chance of  
success is zero.**

**-Phillip Morrison 1959**