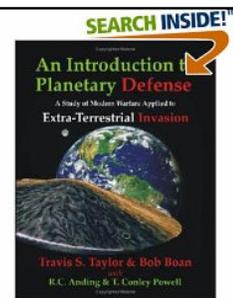
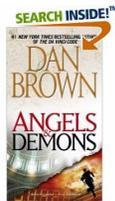


April 26, 2007

Agenda

- Review Chs. 21-24
- Melissa's group presentation
- Crab Lab in Computer lab

- LHC and antimatter
- CERN, big bang, physicists



- "a serious look at defending the planet in the event of an extra-terrestrial invasion"

Prizes in Navigation

- "The X PRIZE Foundation began a revolution in private spaceflight with the \$10 million Ansari X PRIZE. On October 4, 2004, the Mojave Aerospace Ventures team, led by famed aircraft designer Burt Rutan and financed by Microsoft co-founder Paul Allen, captured the Ansari X PRIZE. The world took notice of this great achievement and the winning SpaceShipOne is now hanging in the Smithsonian National Air & Space Museum."
- "Modeled after the \$25,000 Orteig Prize, offered in 1919 by wealthy hotelier Raymond Orteig, to the first pilot who could fly non-stop between New York and Paris. The prize was finally won in 1927 by an unknown airmail pilot named Charles Lindbergh. Lindbergh won the hearts of a nation, and his world-changing achievement spawned a \$300 billion aviation industry."
- From: <http://www.xprize.org>



New Planet: Gliese 581 C



- 1.5x Earth's Radius
- 5x Earth's mass
- 1/15x Earth's semimajor axis
- Expected surface temp: 32-104 degrees F (habitable zone)
- Detected by 3.6m telescope using wobble
- Orbits red dwarf: 1/3 Solar mass, 20.5 ly away
- ...want to observe in other ways...

Ch. 22—Dark Matter, Dark Energy, and the Fate of the Universe

- Dark Matter—properties, evidence for, possible sources of (MACHOs/WIMPs), where is it, how we might see it
- Dark Energy—evidence for, implications
- Structure—how we view, not random—instead structure
- Final fate—critical density, recollapsing/critical/open/accelerating, cosmological constant

Ch. 23—The Beginning of Time

- The Big Bang
 - Various properties defining the eras...Plank, particles, atoms
 - GUT, electroweak, unification
 - Inflation..what is it good for?
 - Evidence for: CMBR, nucleosynthesis
- CMBR
 - Near-perfect thermal spectrum
 - Anisotropies...quantum wiggles
- Olber's paradox

Ch. 24—Life in the Universe

- Life on Earth
 - Implications for life elsewhere
 - Is formation of life here robust or lucky?
 - Will life elsewhere look like life here?
 - Necessities for life
- Life in Solar System...which bodies hold promise and why?
- Life Around Other stars
 - Habitable zone
 - Finding other planets
 - Finding signatures of life
 - Rare Earth hypothesis
 - Drake Equation
- Interstellar Travel
 - Speed limit of c
 - So much fuel may be impossible to carry it (ramjet/solar sail)
 - Time and time dilation issues
 - Cosmic rays/mutation/cell death
- Fermi Paradox

Things to Remember

- Science
 - Cool, relevant, and practical
 - Limited in scope
 - Not always perfect, but converges (fixes mistakes)
- Astronomy (astrophysics, cosmology, astrobiology)
 - Has become very quantitative
 - Brings together all the natural sciences
 - Continues to tackle some of Life's big questions
- Perspective
 - Big and small relative
 - Time and space intertwined (separately relative)
 - Universe is a dynamic, turbulent, dangerous, beautiful place

Project Tips

- Don't read, try to "converse"
- Ensure text visible
- Be enthusiastic...act like you enjoyed the research
- End strong...give cue to audience so they'll clap

