





Selling Science to Unwilling Buyers:



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Lawrence M. Krauss
CAP Meeting
Saskatoon, June 19, 2007

THE FIRST MISTAKE!

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- ASSUMING YOUR AUDIENCE IS INTERESTED IN WHAT YOU ARE ABOUT TO SAY!!!!!!!

SCIENCE IS:

SCIENCE IS:

- dull

SCIENCE IS:

- dull
- hard

SCIENCE IS:

- dull
- hard
- unrelated to the world...

REMEMBER HOW
BORING IT CAN SEEM

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- put yourself in the place of the listener

REMEMBER HOW BORING IT CAN SEEM

- put yourself in the place of the listener
- don't expect interest: create it!

AN EXAMPLE

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- CLASSICAL MECHANICS!

- GALILEO!!

Most People perceive
themselves as fundamentally
uninterested in science.

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uninterested in science.

• PROOF:

Most People perceive themselves as fundamentally uninterested in science.

- PROOF:

- party

Most People perceive themselves as fundamentally uninterested in science.

- PROOF:

- party

- BUT... THEY ARE FASCINATED BY WHAT IT IS **ACTUALLY** all about.

CONFRONT
MISCONCEPTIONS!!!

CONFRONT MISCONCEPTIONS!!!

- ah ha experience---orgasmic!

CONFRONT MISCONCEPTIONS!!!

- ah ha experience---orgasmic!
- only way people remember?

CONFRONT MISCONCEPTIONS!!!

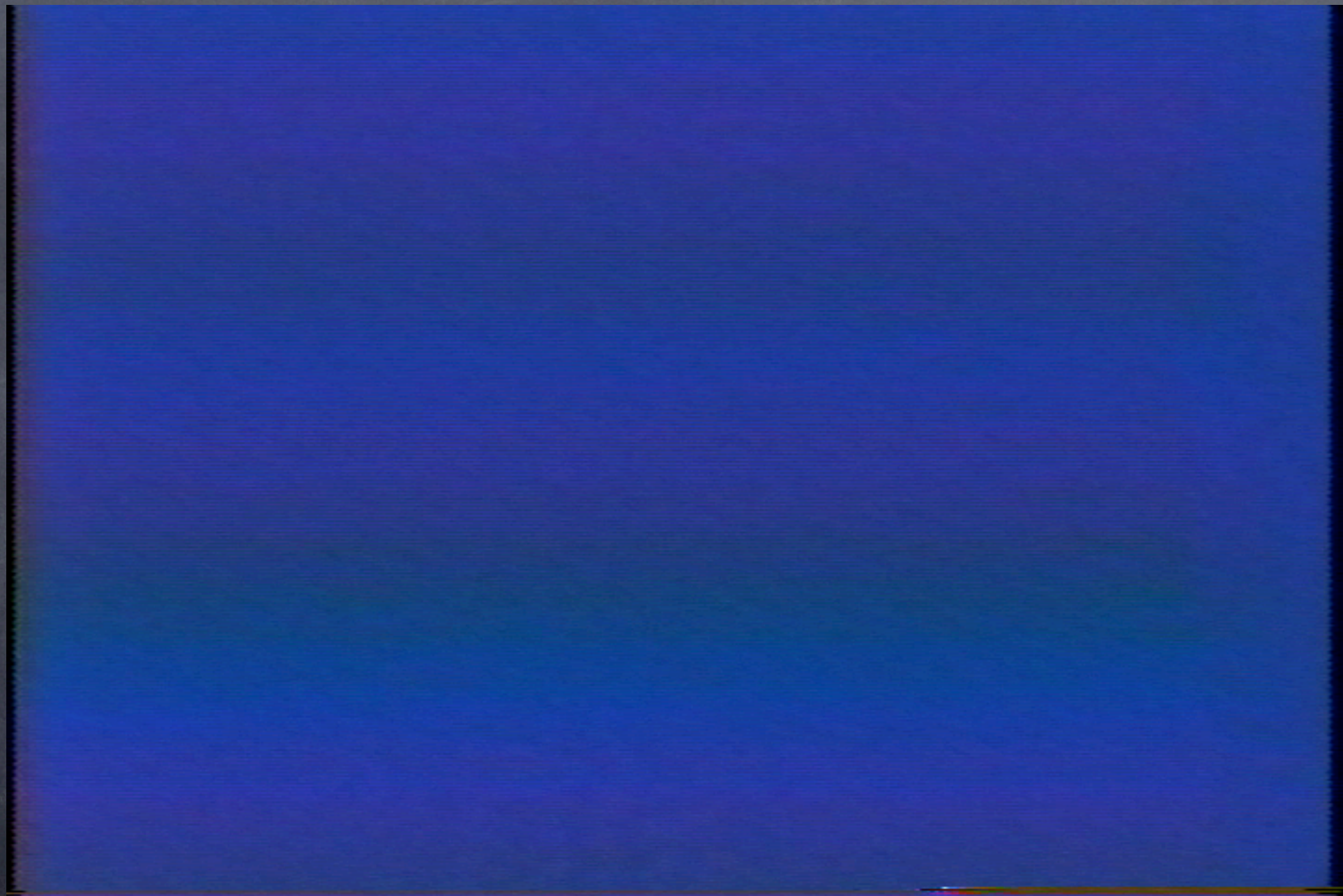
- ah ha experience---orgasmic!
- only way people remember?
- PLENTY OF EXAMPLES: ALMOST ALL OF SCIENCE..

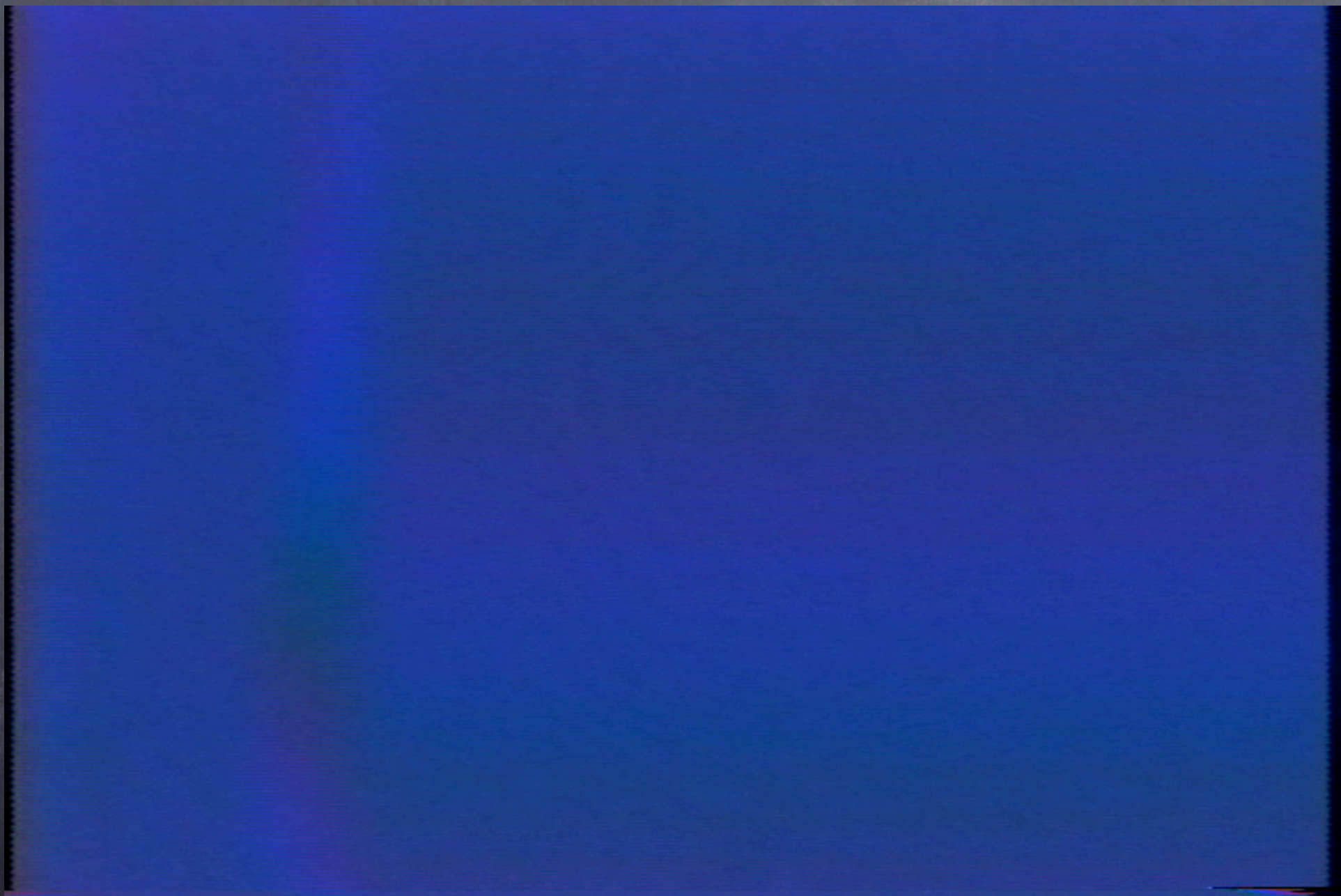
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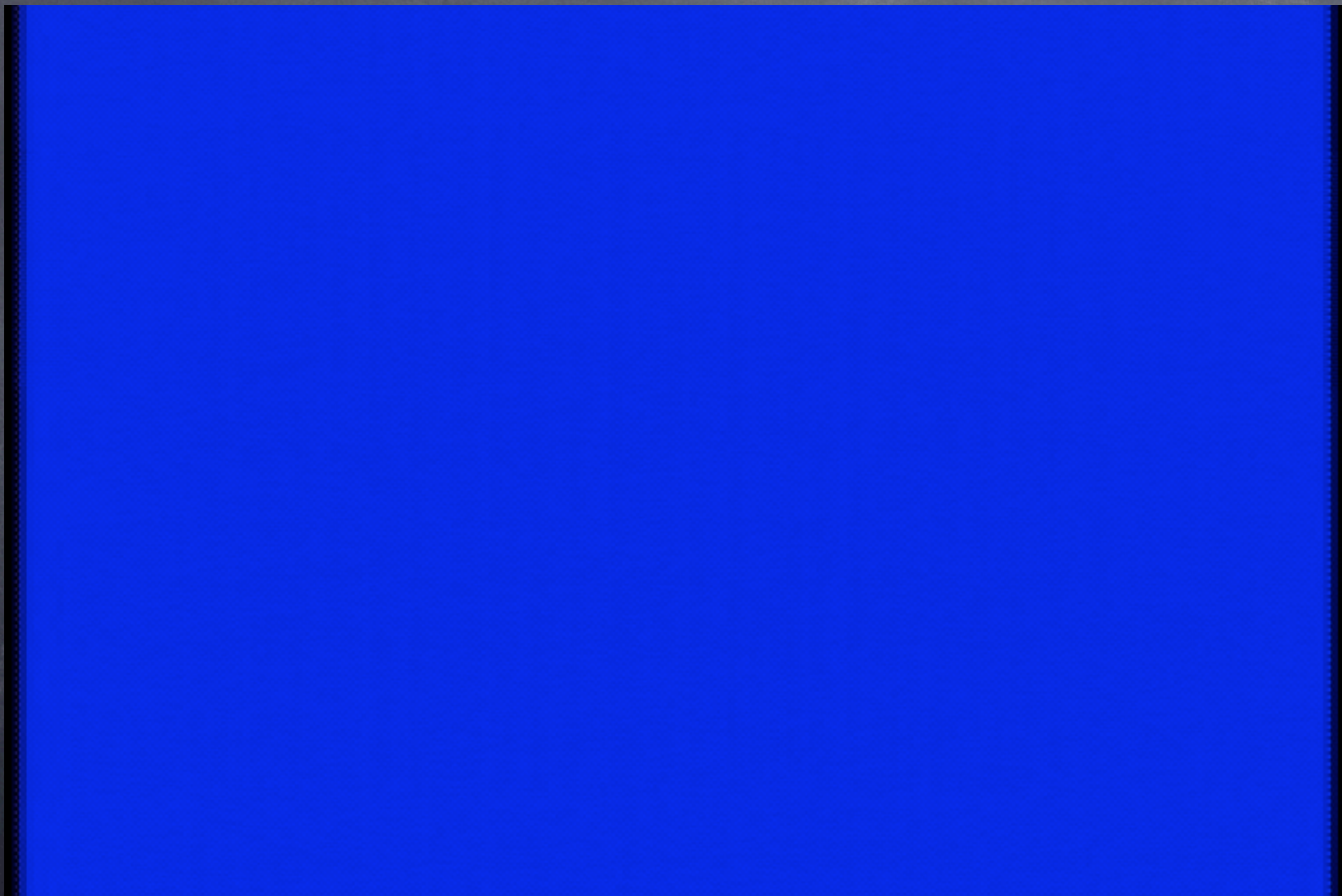
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CONFRONT MISCONCEPTIONS!!!

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- PLENTY OF EXAMPLES: ALMOST ALL OF SCIENCE..
 - STAR TREK
 - UFO's...







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Item #BERT Bermuda Triangle



Bermuda Triangle: Secrets Revealed

Examine the scientific theories that try to explain the Bermuda Triangle events. Could it be time warps, tidal waves, black holes, or even UFO's? 46 minutes.
Item #BTSR Bermuda Triangle: Secrets Revealed



Nostradamus

It appears that this physician predicted Hitler, the JFK assassination, and the Challenger explosion. This A&E video explores how he did it. 50 minutes.
Item #NOST Nostradamus



Secrets of the Psychics

Travel to Moscow's prestigious Institute of the Brain to learn about real research on the power of psychics. It's mind-boggling! 60 minutes.
Item #SOTP Secrets of the Psychics



Bigfoot

Legend has it that a mammoth creature romps through the Himalayan forests. Real film footage will amaze your students! 30 minutes.
Item #BF00 Bigfoot

Mysteries of Mankind

When imagination runs rampant and hysteria dominates reason, science steps in to provide a pragmatic, rational viewpoint. Your students will see how experts use the scientific method to examine evidence and dispel myths. Only National Geographic could make the truth so intriguing! 60 minutes.
Item #MYOM Mysteries of Mankind



Stargate

Could there be time fissures through which we could step into a parallel world? This creative film poses the question. PG-13. 119 minutes.
Item #STAR Stargate



Atlantis: The Lost Civilization

Pottery fragments, ancient texts, and other artifacts point to a civilization lost beneath the sea! Scientists examine the evidence. 50 minutes.
Item #ATLC Atlantis: The Lost Civilization



Lake Monsters

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Item #LMON Lake Monsters



Loch Ness Monster

A&E takes an objective position on the reports of a great monster in a Scottish lake. Scientists discuss the viability of such a life form. 50 minutes.
Item #SOLN Loch Ness Monster



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Some Facts and Figures

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- In a 2001 NSF Survey on Science Literacy:
 - 53% of American adults were unaware that the last dinosaur died before the first human arose.
 - 50% of adults knew that the earth orbits the sun, and takes a year to do it.
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- 45% of US adults surveyed in Nov 2004 stated their belief that God created Humans in their present form than 10,000 years old.



SCIENCE AS NON-CULTURE!

Science Education?



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- Scientific Ignorance pervades our society.
- Our public schools are not effectively teaching science. U.S. 12th graders recently performed below the international average for 21 countries in math and science
- 66% of undergrads in science and engineering in Japan, 59% in China, 32% in the US

This makes it difficult to distinguish
nonsense from sense..

The X-Files' Rules:

I Want To Believe

Trust No One

The Truth Is Out There



“I believe in an open mind, but not so open that
your brains fall out.”

Arthur Hays Sulzberger
Publisher, New York Times 1935-61

In March 1996, Presidential Candidate Patrick Buchanan asserted ABC's *This Week*, that he personally was not descended from monkeys, and he didn't think children should be taught that they are. Not a single reporter questioning the candidate asked about this assertion, although he was subjected to harsh criticism of his positions on trade protectionism, and immigration limits---all issues about which there is much more room for debate.





Fallacy self-evident???



Fallacy self-evident???

- Hesitancy to offend religious sensibilities?



Fallacy self-evident???

- Hesitancy to offend religious sensibilities?
- Hesitancy to state that some things are **NOT** open for debate...

- Because of lack of comfort on scientific matters there is a hesitancy for many journalists to make pronouncements....

Journalism:

Journalism:



Journalism:

 There are always two sides to every story

Journalism:

→ There are always two sides to every story

Science:

Journalism:

→ There are always two sides to every story

Science:



Journalism:

→ There are always two sides to every story

Science:

→ Most times one side is simply wrong





Fear of Science!

Religion and Science Colliding:

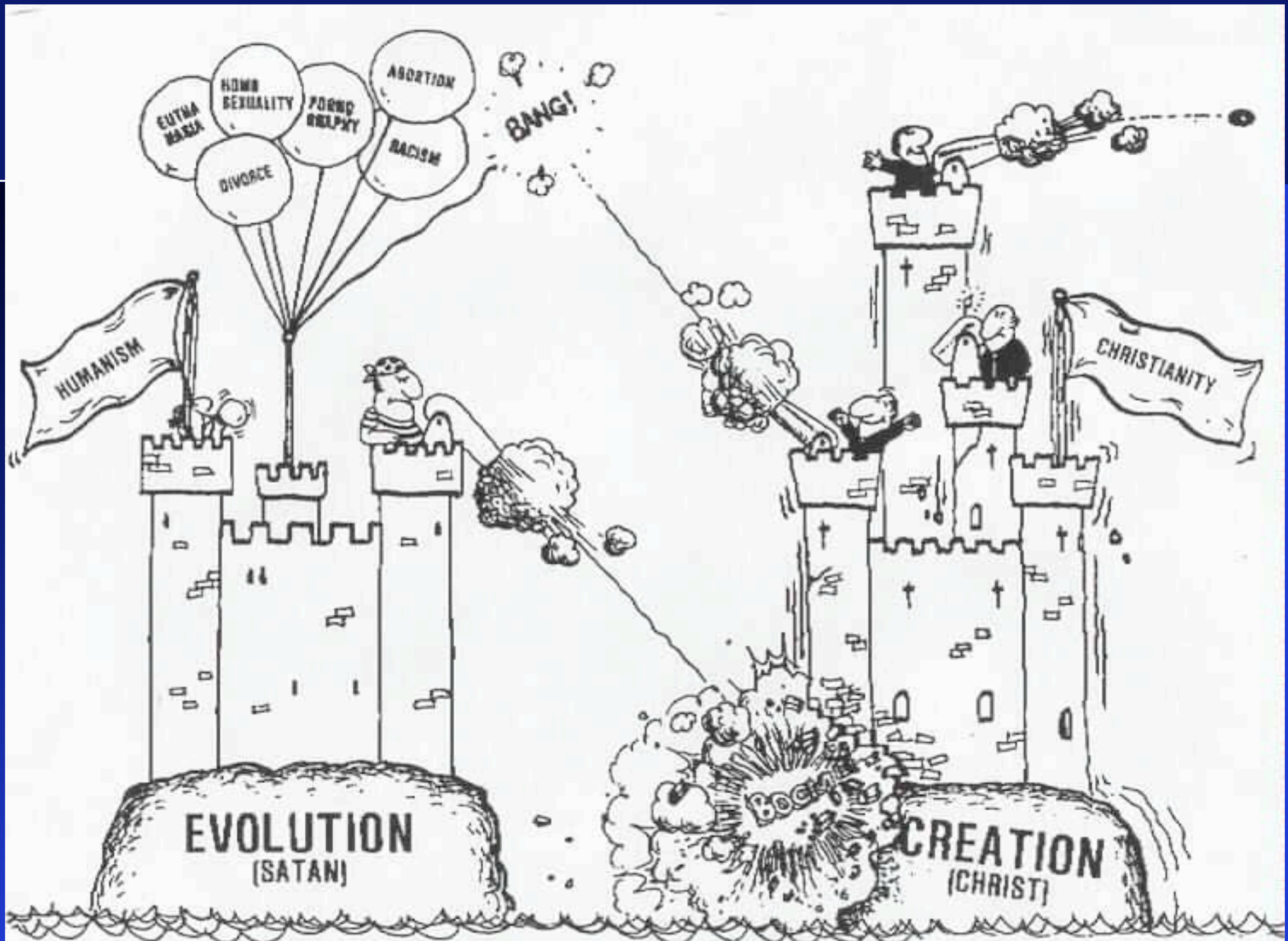
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House majority leader, Tom Delay, who himself has a degree in biology, argued that the Columbine shootings occurred in part “because our school systems teach our children that they are nothing but glorified apes who have evolutionized out of some primordial mud.”



THE UNIVERSE IS A REMARKABLE
PLACE WITHOUT ALL THE JUNK!

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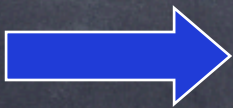
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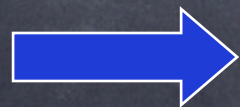
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Science works!

Science is not the
enemy.

Science is not the
enemy.

Faith is not the enemy.

Science is not the
enemy.

Faith is not the enemy.

Ignorance is the enemy!

Science is not dangerous,
it is fascinating!

Remember your own
enthusiasms

Remember your own enthusiasms

- Why are you communicating?

Remember your own enthusiasms

- Why are you communicating?
- What interests you?

Remember your own enthusiasms

- Why are you communicating?
- What interests you?
- Draw from your own experience

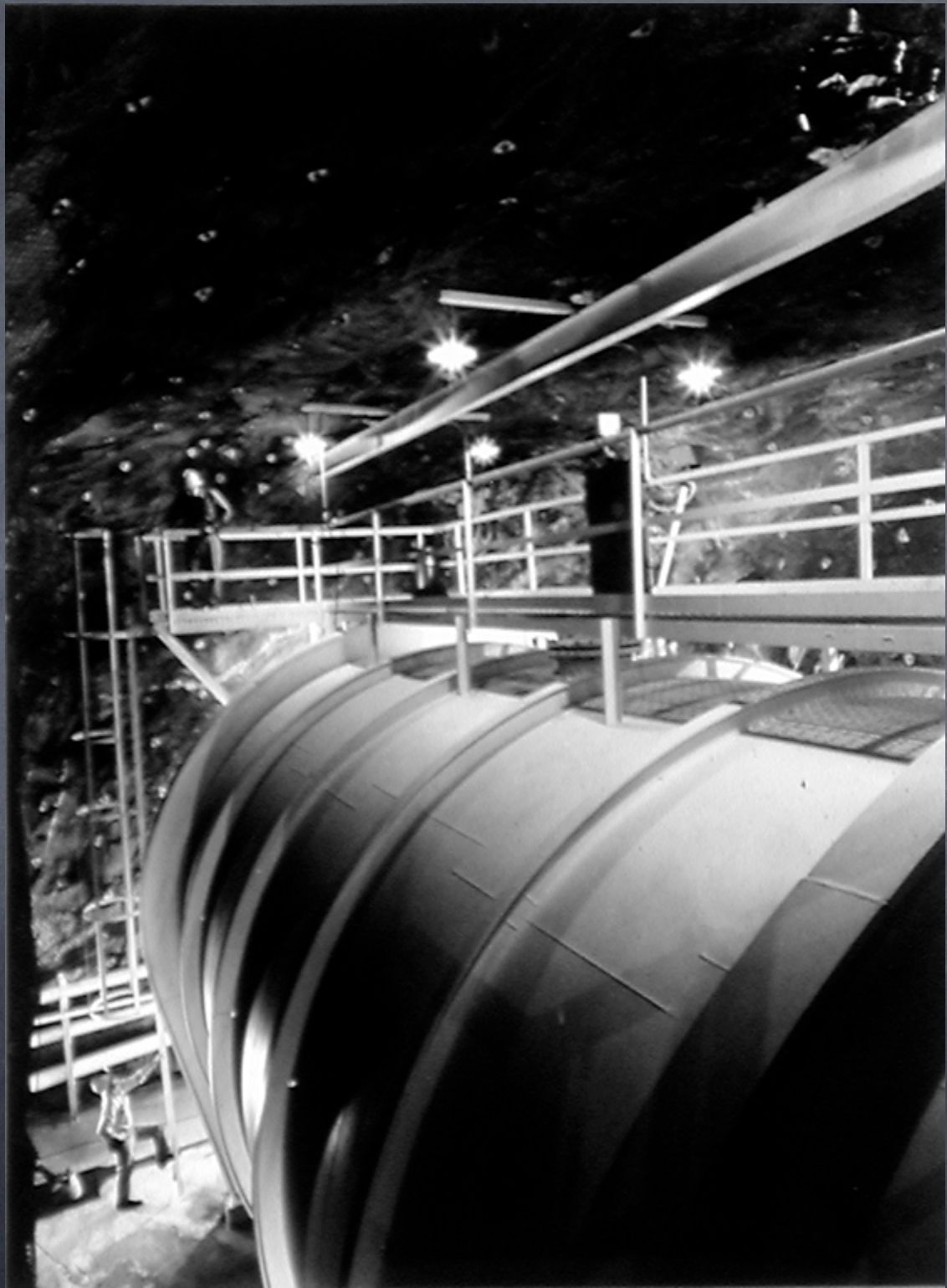
REACH OUT!

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- Make connections to MODERN SCIENCE

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- Make connections to MODERN SCIENCE
- Touch on what fascinates people!



Back to Classical Mechanics...

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• CUTTING EDGE

Back to Classical Mechanics...

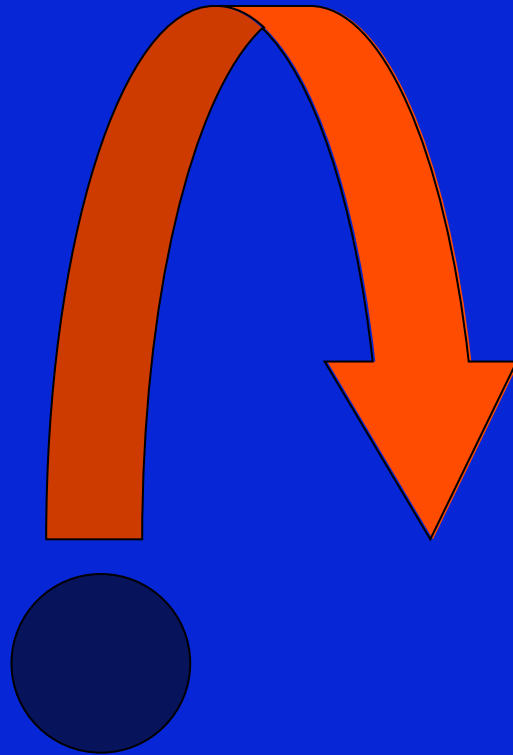
- CUTTING EDGE
- NOT JUST DEAD WHITE MEN!

How will the Universe End?

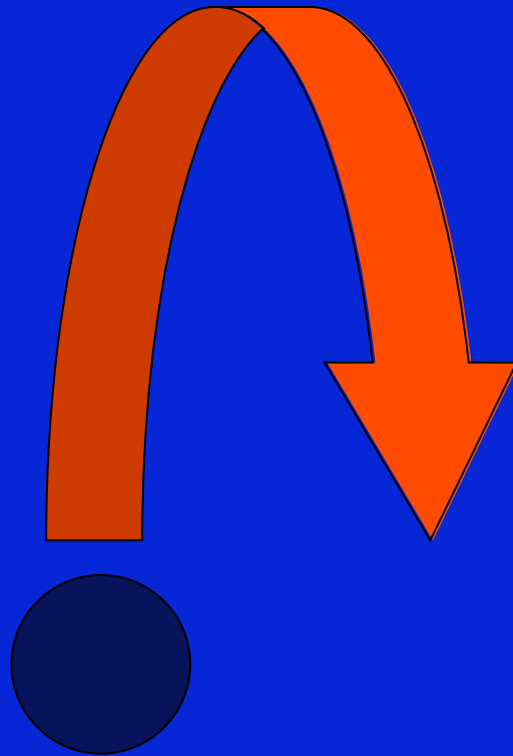
How will the Universe End?



How will the Universe End...?

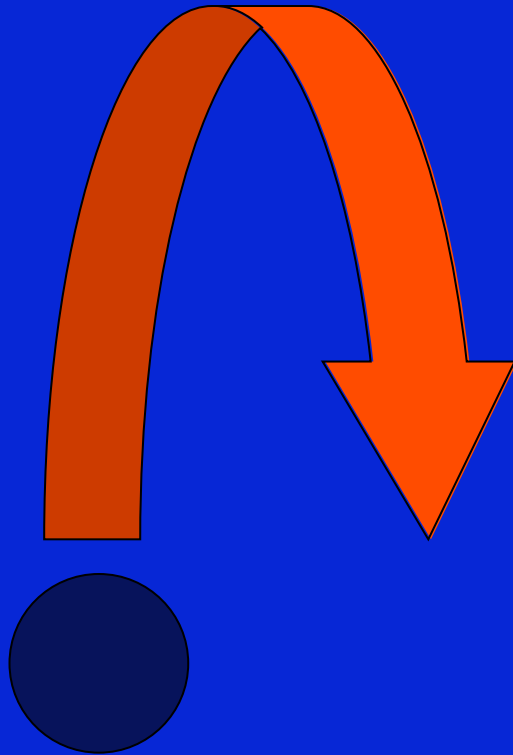


How will the Universe End...?



$$E_T = \frac{1}{2}mv^2 - \frac{GMm}{r}$$

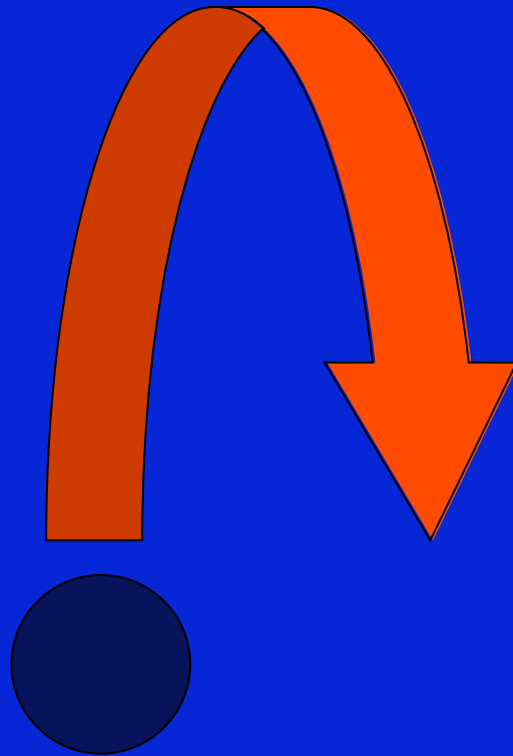
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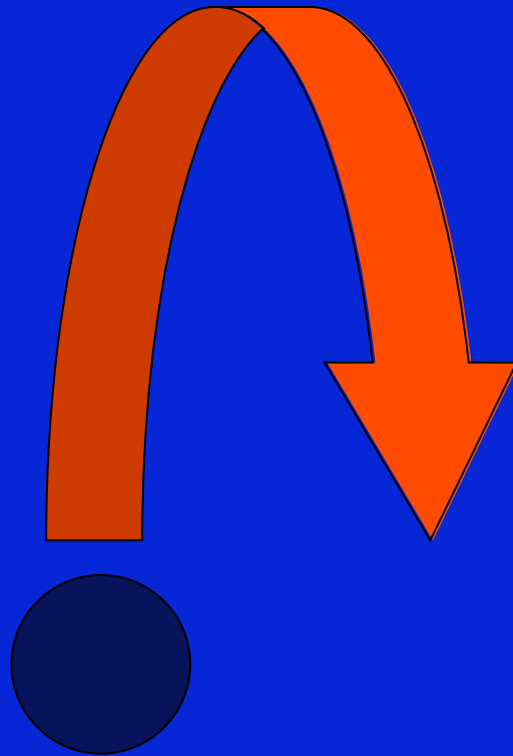
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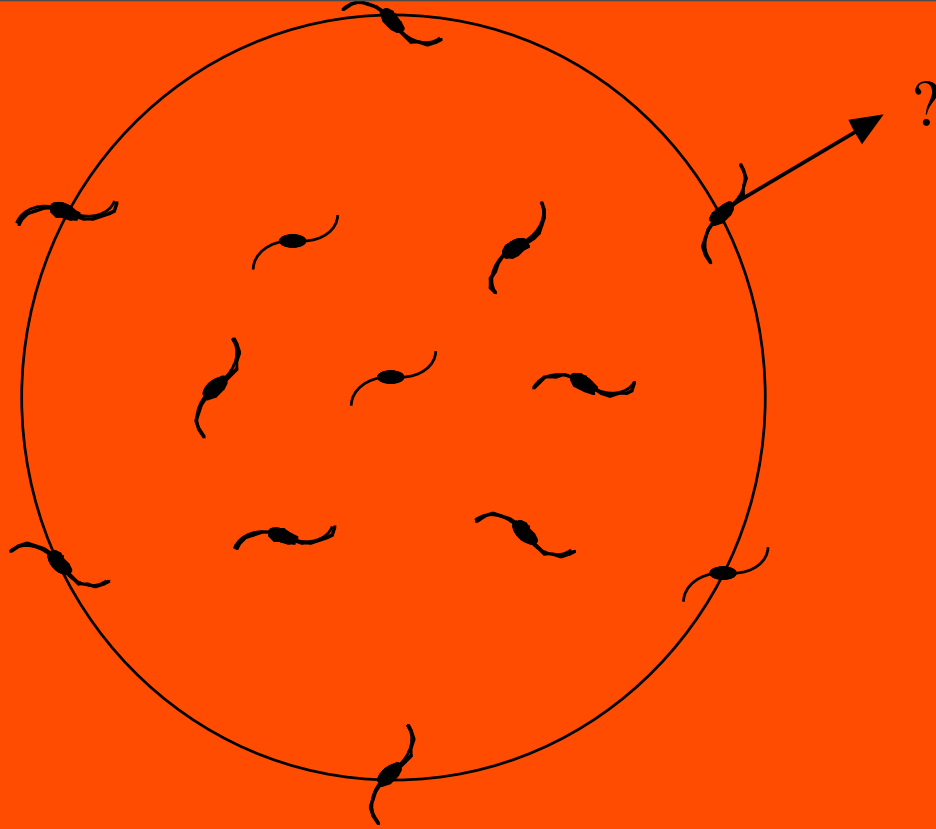
$$E_T = \frac{1}{2}mv^2 - \frac{GMm}{r}$$

+

-

$E_T > 0$ escape

$E_T < 0$ return



A. $E_{\text{motion}} \approx v^2 \approx H^2$ (+)

B. $E_{\text{grav.}} \approx M \approx \rho$ (density) (-)

$B/A > 1 \Rightarrow$ collapse
 $B/A < 1 \Rightarrow$ expand forever

$B/A = \Omega$ Measure Ω !

“The fairest thing we can experience is the mysterious.. It is the fundamental emotion that stands at the cradle of true art and true science..”

Albert Einstein