



Plasmas, Dusty Plasmas, and Microgravity

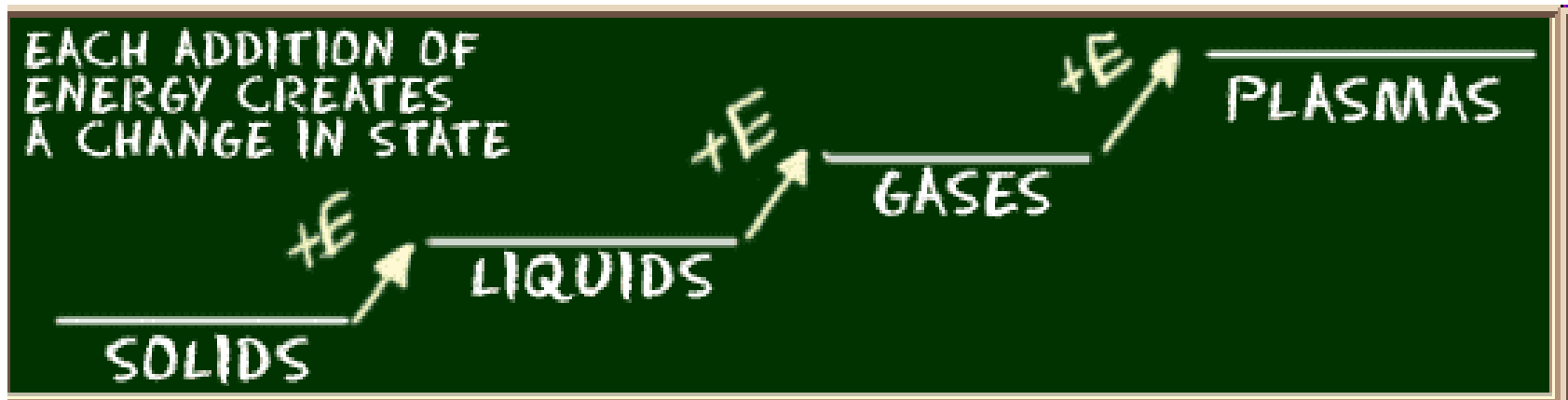


Darrick Jones

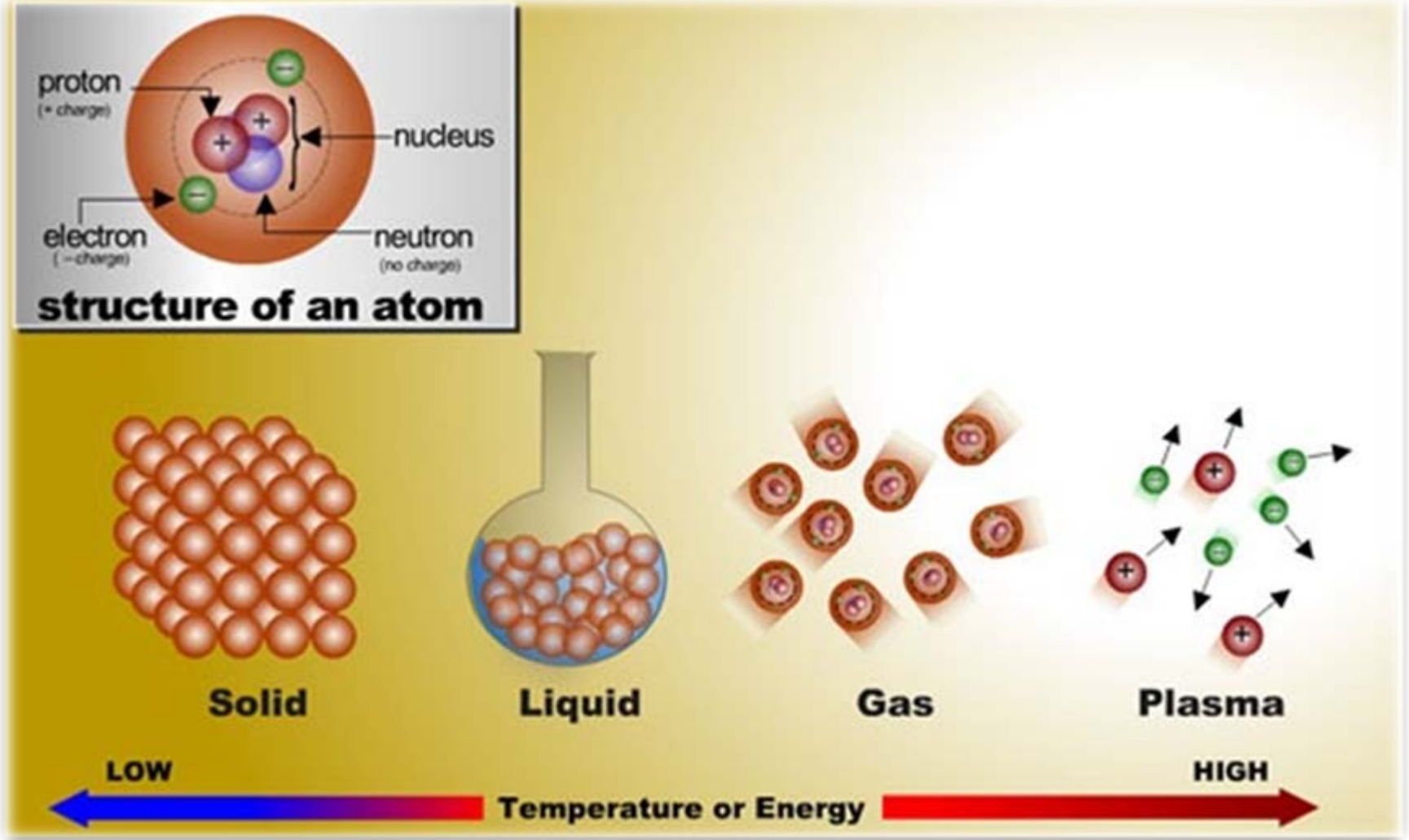


What is a Plasma?

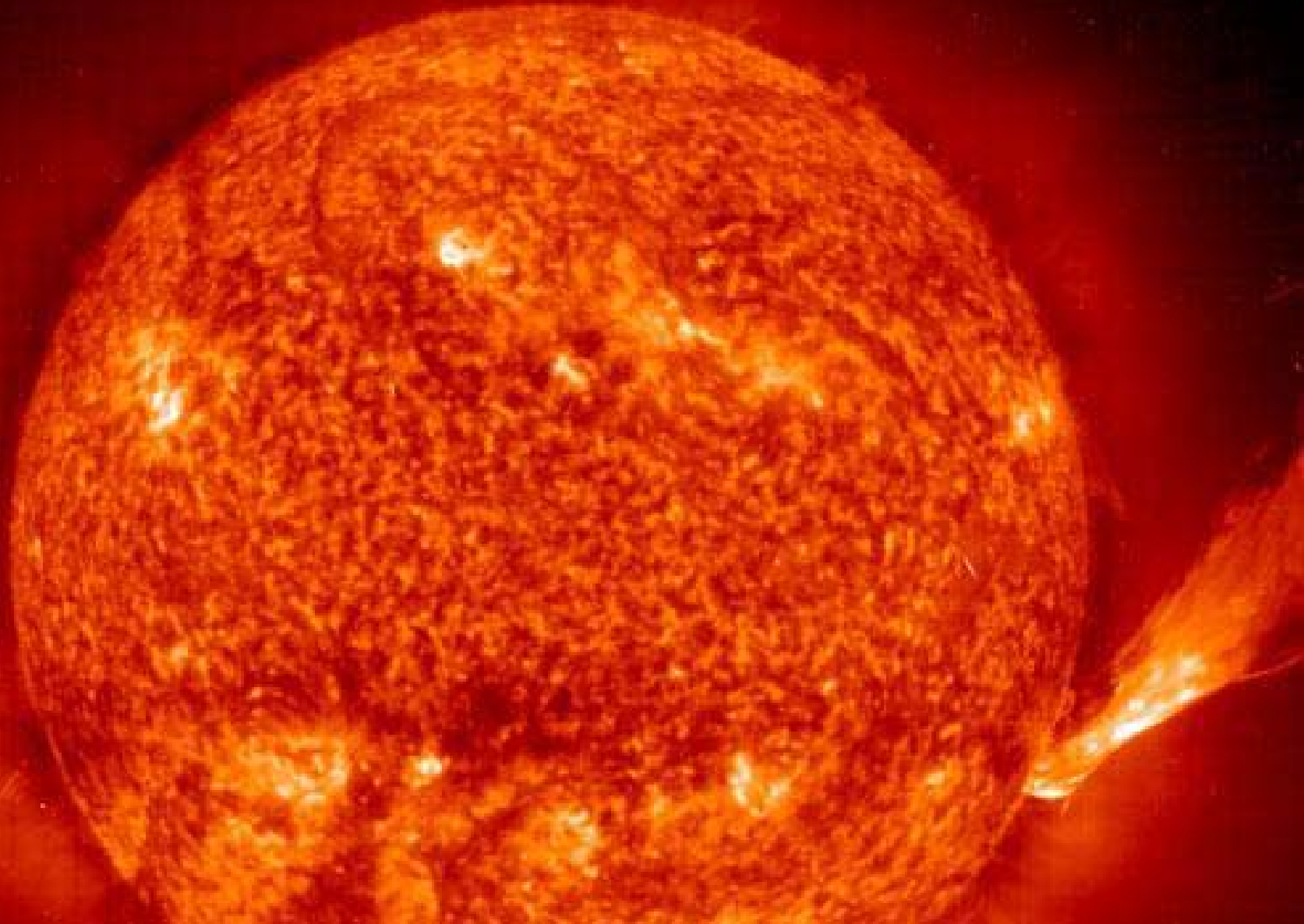
- Fourth State of Matter
- Occur when you add energy to a gas, causing it to ionize.
- Free moving electrons and ions (atoms that have lost electrons).



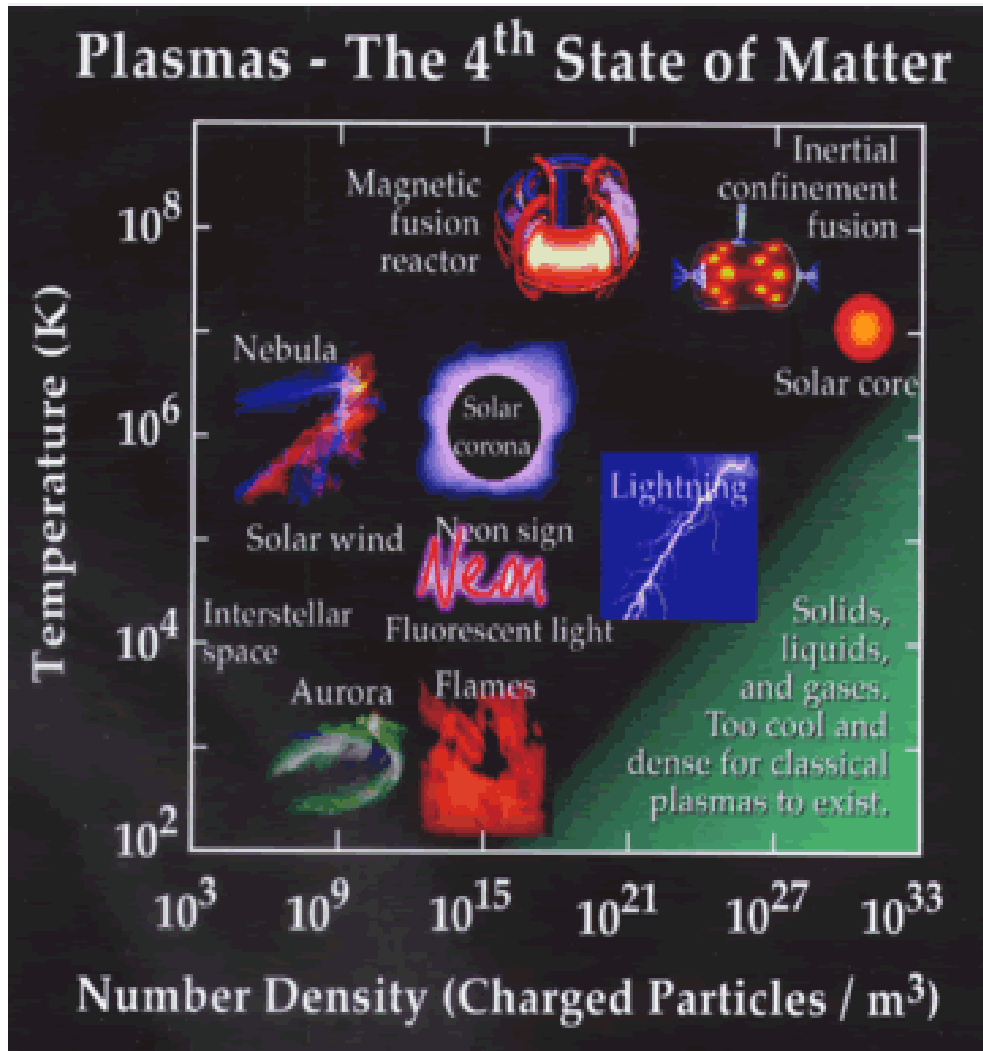
What is a Plasma?



Where can you find plasmas?



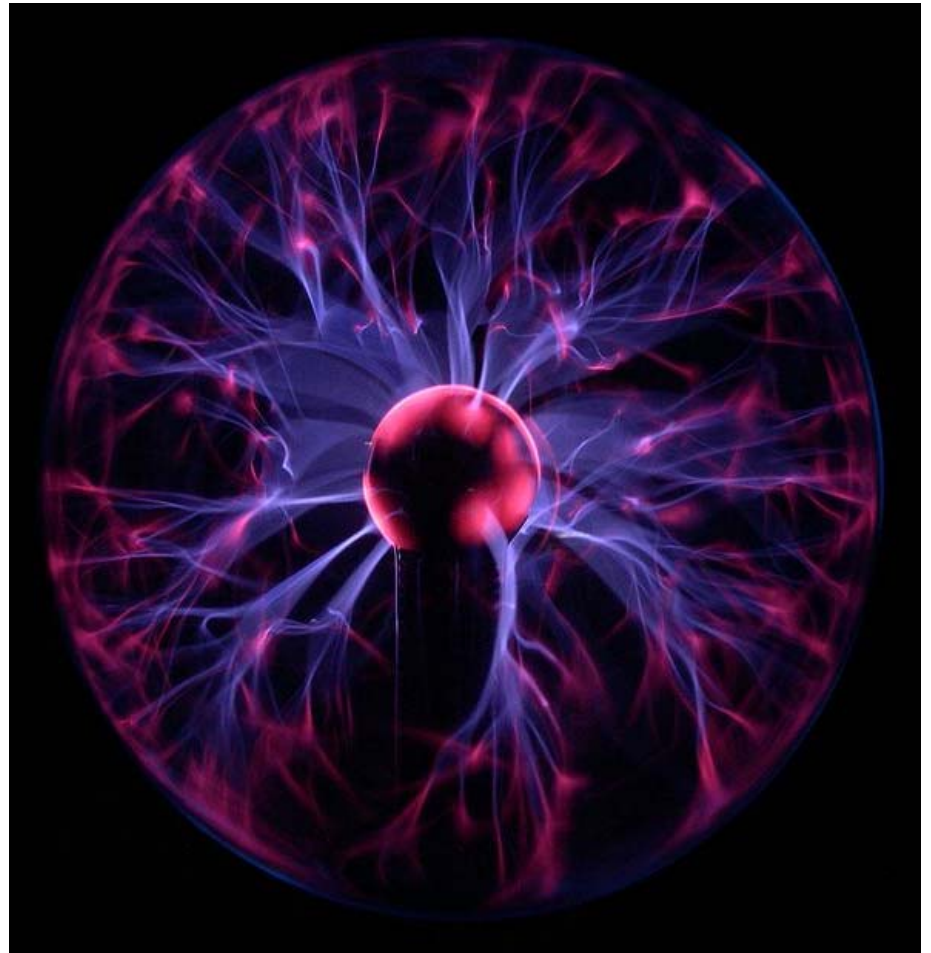
Where can you find plasmas?



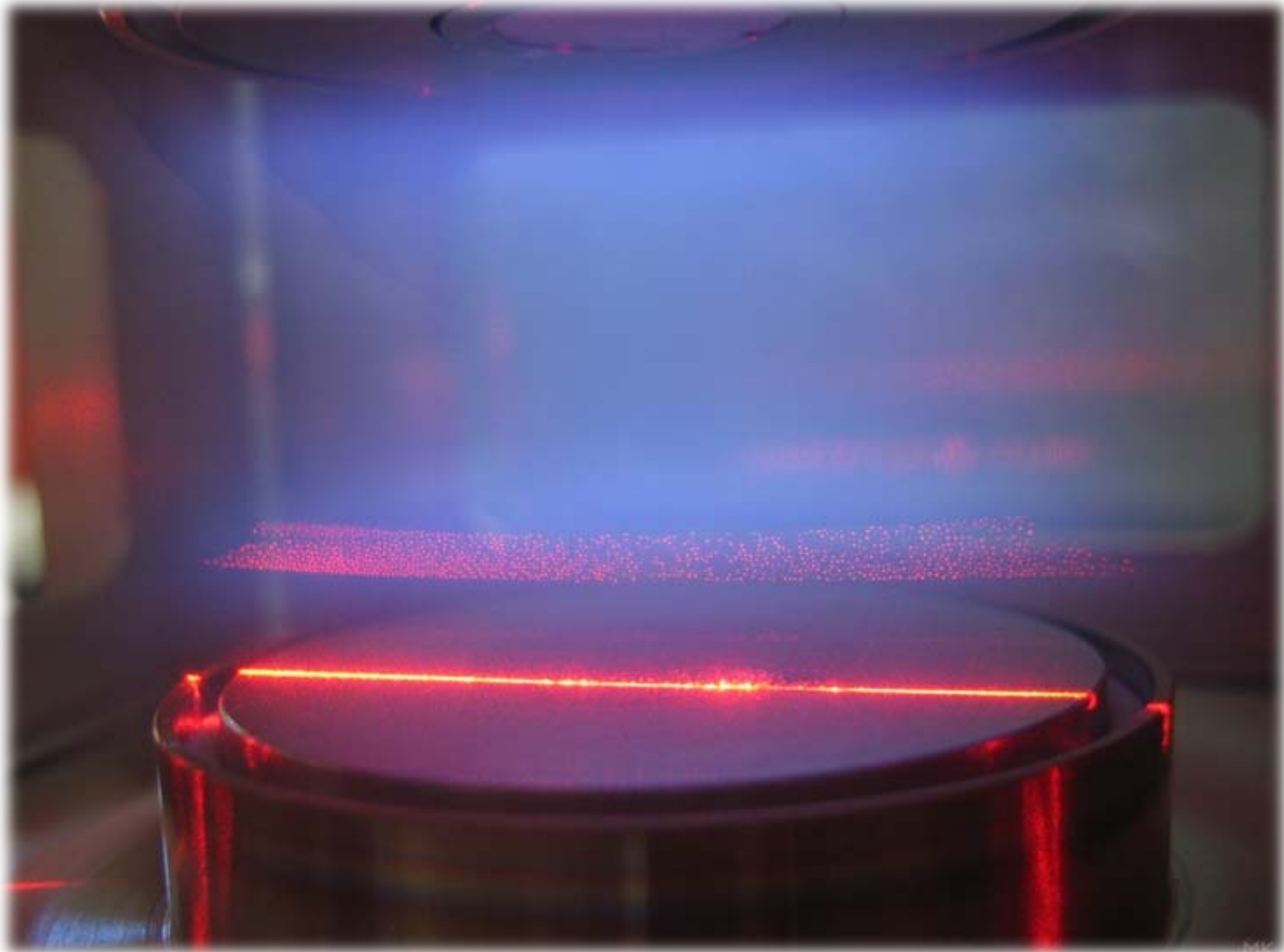
- Plasmas make up 99% of the visible universe.
- Naturally occurring:
 - Lightning
 - Aurora
 - Stars
- Artificially produced:
 - Plasma TVs
 - Fluorescent Lamps
 - Neon Signs
 - Fusion Reactors

Complex Plasma Phenomena

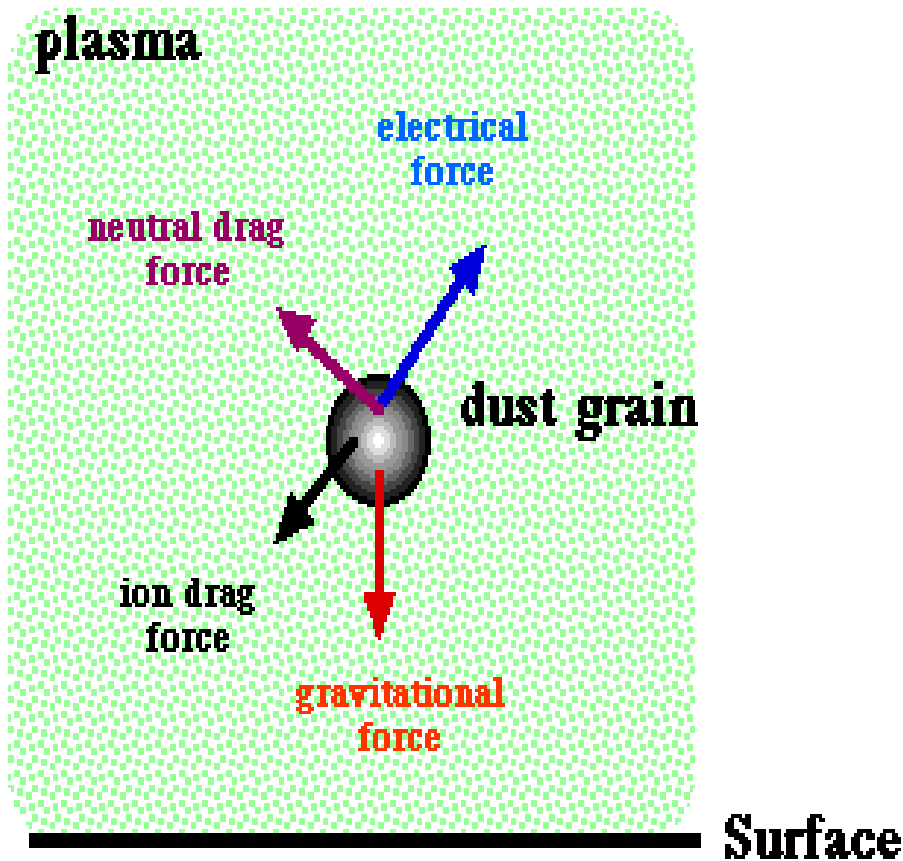
- Some examples:
 - Filamentation
 - Shocks or Double Layers
 - Ultracold Plasmas
 - Non-neutral Plasmas
 - ***Dusty Plasmas***



What is a Dusty Plasma?

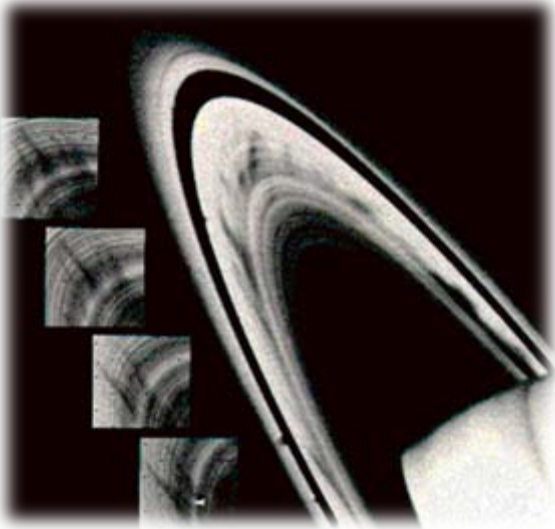


What is a Dusty Plasma?



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- An assortment of tiny particles immersed in a plasma.
- Dust particles gain a negative charge resulting from collisions with electrons in the plasma.

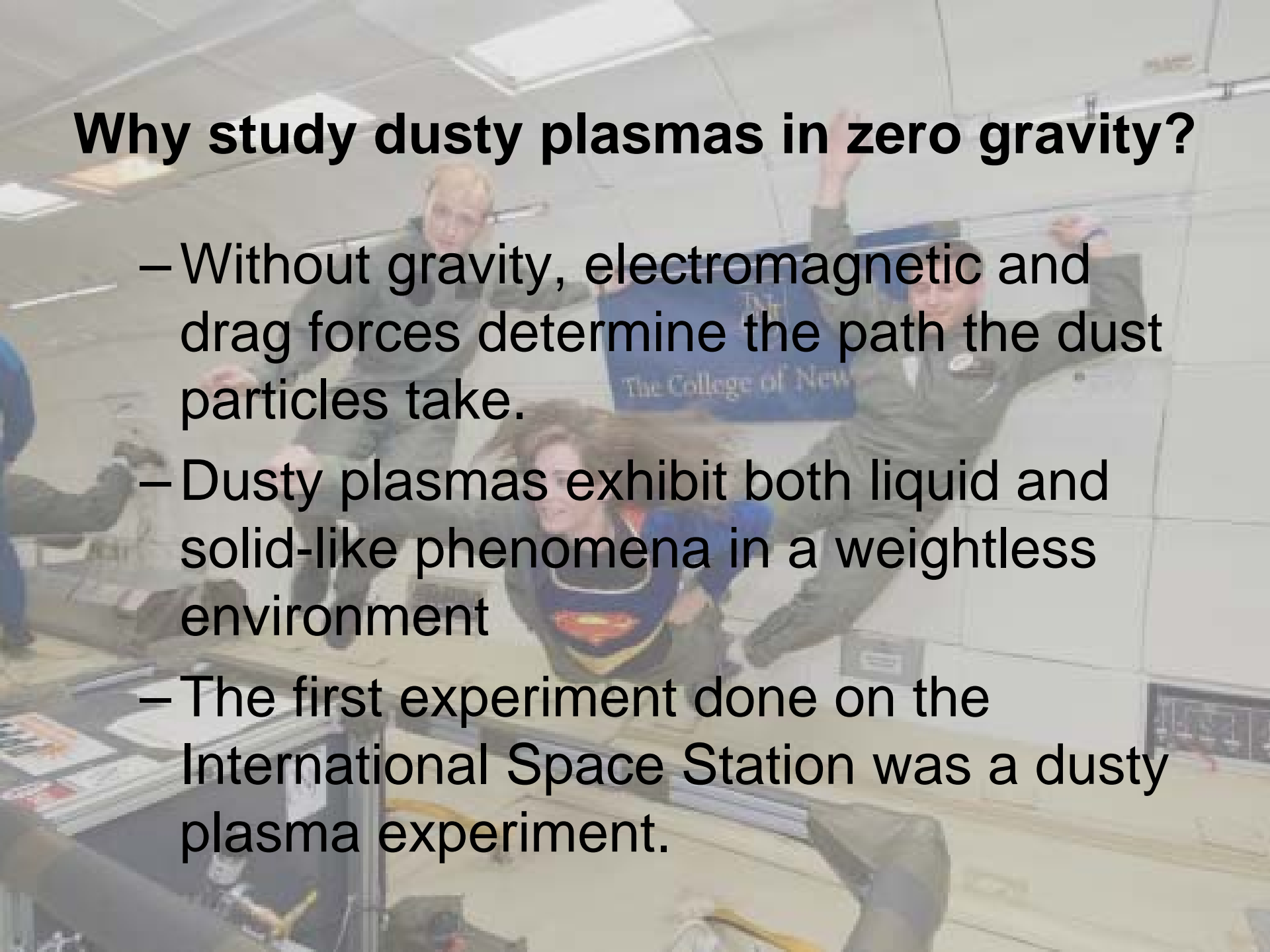
Applications



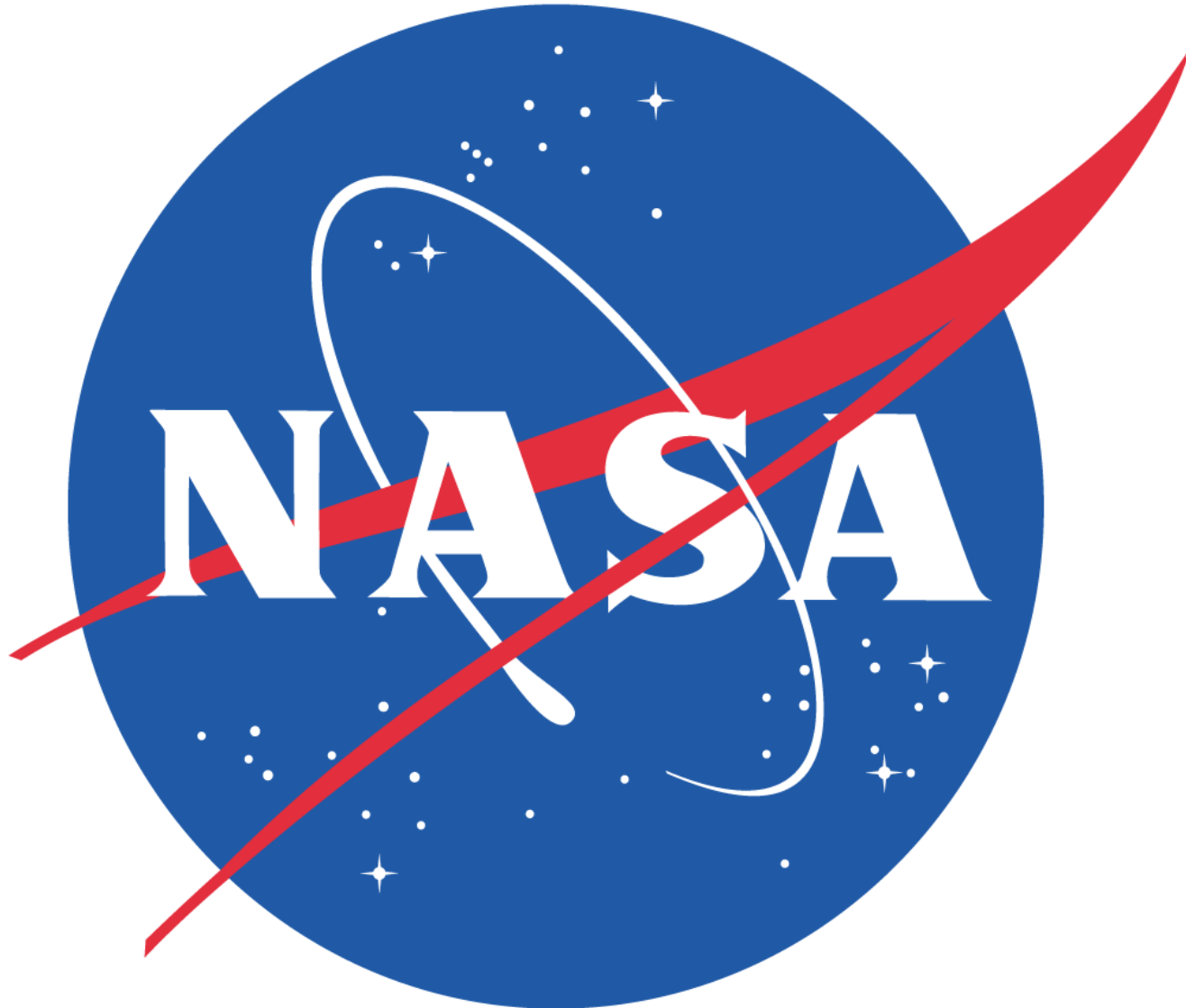


Why study dusty plasmas in zero gravity?

- Without gravity, electromagnetic and drag forces determine the path the dust particles take.
- Dusty plasmas exhibit both liquid and solid-like phenomena in a weightless environment
- The first experiment done on the International Space Station was a dusty plasma experiment.



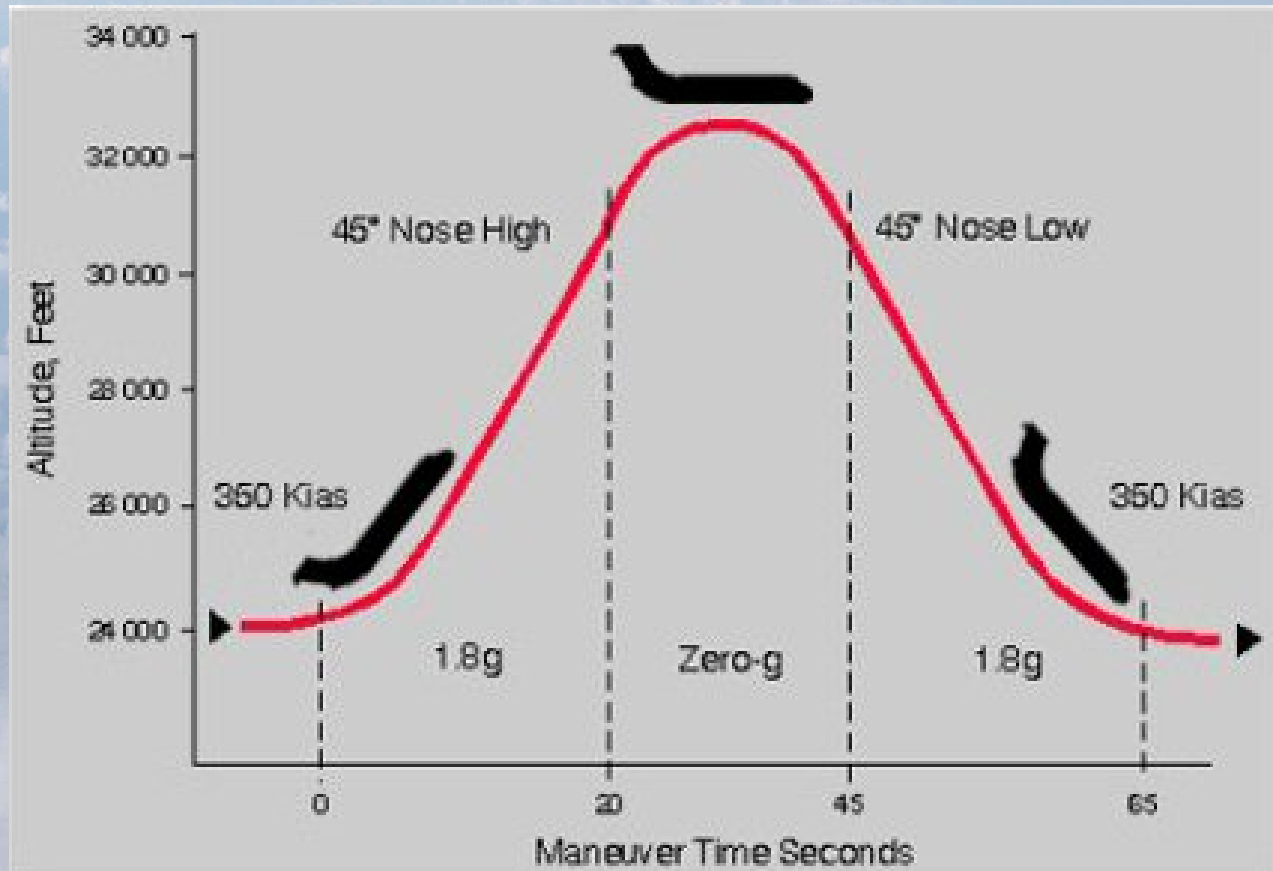
How is that possible?



Microgravity?

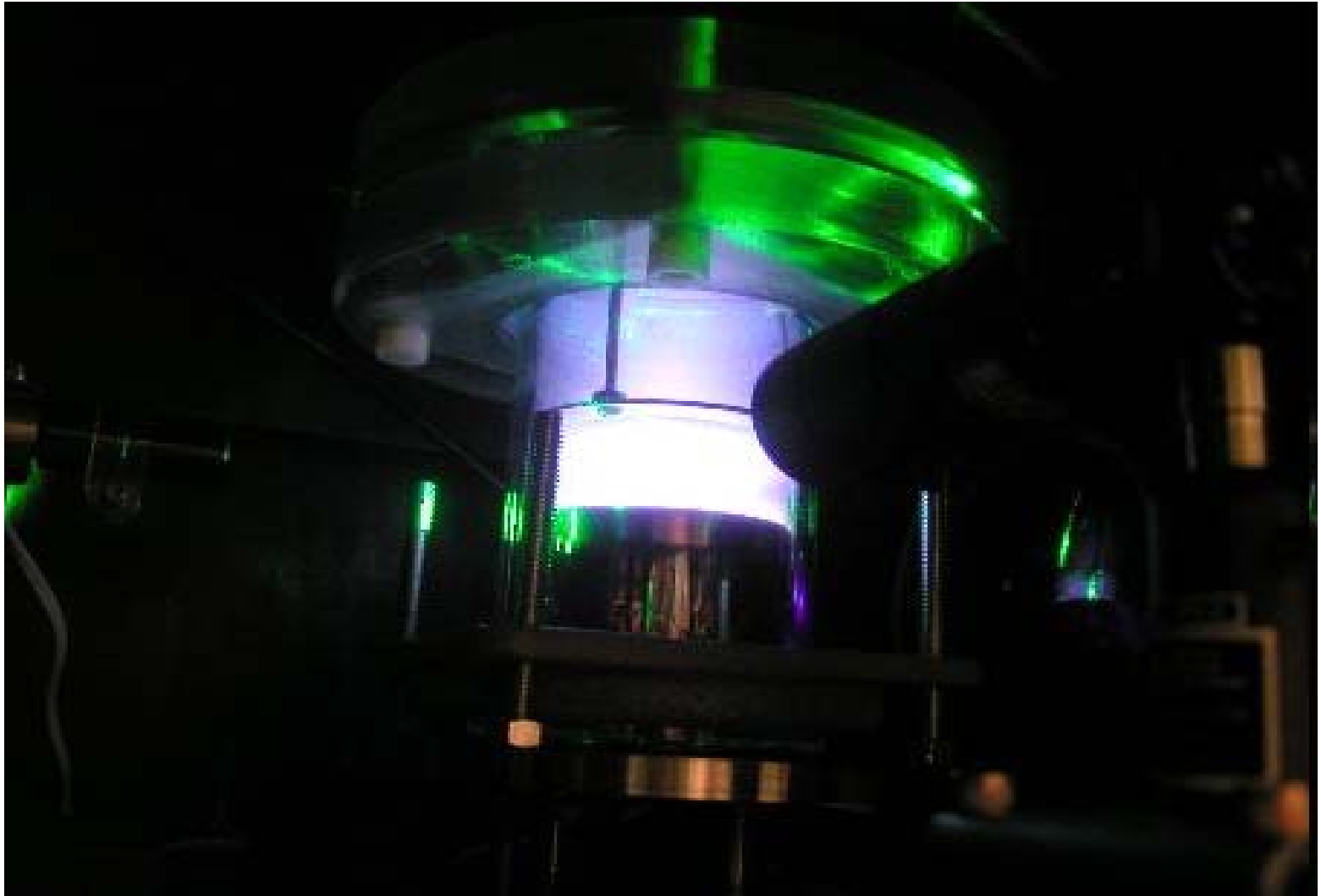


How Microgravity Works

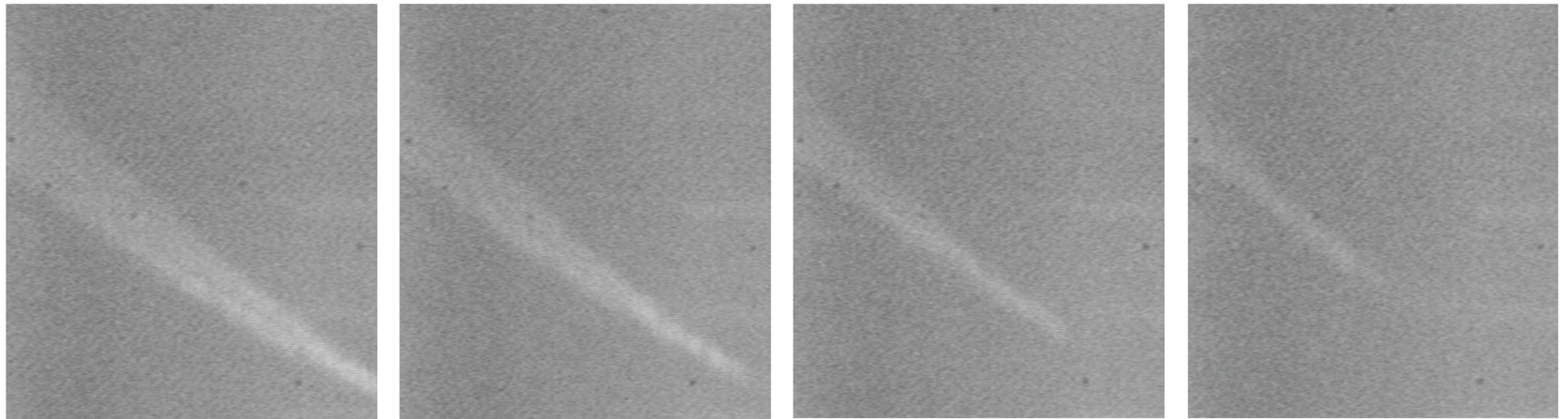


32 parabolas per flight!!

Our Experiment



What We Saw



$g = 0.325$

$g = 0.297$

$g = 0.270$

$g = 0.245$



Increasing g

Q and (possibly) A

